

**Final Report  
Treatability Study  
for the Howe Valley Site  
Bench-Scale Test Protocol:  
Effect of Roto-Tilling on  
VOC Volatilization from  
Howe Valley Soils**

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## **EXECUTIVE SUMMARY**

The United States Environmental Protection Agency (USEPA) has selected soil aeration as the preferred technology for treating soil at the Howe Valley Landfill, Hardin County, Kentucky. This protocol was designed to assess the fate of volatile organic chemicals (VOCs) from surface soils aerated via roto-tilling at the Howe Valley Site. Specifically, a bench-scale laboratory study was designed to test various procedures and site conditions, and to optimize the remedial design of the selected technology.

Soils spiked with tetrachloroethene (PCE) were mechanically mixed each day using a procedure which simulates the roto-tilling of soil in the field. VOC concentrations in the soils were analyzed at various times during the study. In addition, a second study determined the initial rate of PCE volatilization from the soil.

Most of the PCE in the soil volatilized within the first few hours of the study. PCE concentrations in soil at the conclusion of the first day of this study were below the soil action level ( $> 7.50 \text{ mg/kg}$ ).

The initial rate of volatilization for PCE was  $38 \text{ mg PCE/m}^3 \text{ air/minute}$ . As the study progressed, and soil concentrations of PCE decreased, the PCE volatilization rate decreased.

The results of this study show that roto-tilling should release VOCs from Howe Valley soils. VOC concentrations in roto-tilled soils should reach soil action levels in a very short time period.

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## INTRODUCTION

The objective of conducting a treatability study during the Remedial Design/Remedial Action (RD/RA) phase is to establish the design and operating parameters for optimization of the selected remedial technology. In other words, treatability studies are conducted primarily to provide sufficient data for the full development and evaluation of the selected treatment alternatives in support of the remedial design (USEPA 1988, RI/FS).

Soil aeration was the remedial technology tested in this study for Howe Valley soils. The pilot scale testing conducted during the remedial investigation/feasibility study (RI/FS) demonstrated the capability of soil aeration to reduce volatile organic compound (VOC) concentrations below the soil action levels (performance goals). However, the pilot-scale testing was not designed to optimize the soil aeration procedures, or to see how varying site conditions may effect meeting the performance goals.

The bench-scale testing, discussed in this report, was designed to test various procedures and site conditions, and to optimize the remedial design of the selected technology. Additionally, the objectives of the bench-scale treatability study included evaluating the ability of PCE to volatilize quickly from Howe Valley soil under varying site conditions, and to verify that PCE concentrations in soil at the conclusion of soil treatment will still be below the soil action level ( $> 7.50 \text{ mg/kg}$ ).

### Site Background

The immediate health threats at the Howe Valley Site were alleviated through the removal of containerized and non-containerized wastes from the site. Data from soil sampling investigations conducted after waste removal and from a preliminary soil aeration study revealed that residual VOCs were still present in onsite soil. The analysis of groundwater and surface water samples showed that the chemicals had not migrated from the site in concentrations above safe drinking levels; however, the karst geology limited the sampling of groundwater directly beneath the site.

The principle threat to human health and the environment is the potential ingestion of, or dermal contact with, soil containing VOCs. A secondary threat is from ingestion of groundwater containing VOCs. However, the analysis of data derived from groundwater samples taken at Boutwell Spring (the only identified source of water leaving the site) indicated that VOC concentrations are below the maximum contaminant levels (MCLs), or drinking water health-based levels.

The remedial action for the Howe Valley Landfill Site in Hardin County, Kentucky is intended to address onsite soils that contain VOCs above acceptable concentrations with regard to human health and the environment. Soils containing inorganic compounds will be excavated and disposed of in the Chemwaste hazardous landfill in Emelle, Alabama.

### VOCs Identified in Site Soil

The remaining onsite soil which contains VOCs is near the central portion of the site (see Figure 1). The field samples from the central area were analyzed for the four chemicals of concern: 1,1-dichloroethane (DCA); 1,2-dichloroethene (DCE); 1,1,1-trichloroethane (TCA); and tetrachloroethene (PCE). These compounds were chosen because:

- (a) All were common to the major organic waste source.
- (b) These were the primary organic chemicals found in the environmental soil samples.
- (c) These represented the most toxic VOCs present at this site.
- (d) These are representative of the solubility of VOCs present at this site.

With regard to each of the four chemicals of concern:

DCA: No cleanup goal/soil action limit (SAL) has been established for DCA. The only area where it was noted above the detection limit was location 11H (3.0 feet), where it was detected at 13 mg/kg.

DCE: No DCE was detected above the SAL (7.72 mg/kg) on the surface, or a to depth of 6.0 feet. The distribution of DCE above the SAL occurred at location 11E, where duplicate samples contained 15 and 20 mg/kg levels.

TCA: No TCA above the SAL (117.3 mg/kg) was found in any surface sampling location. Two 3.0-foot locations had levels above the SAL; 170 mg/kg at 9.5F.5 and 340 mg/kg at 11H. TCA levels were above the SAL at one location over 6.0 feet; 200 mg/kg at 9.5C.5.

PCE: The only surface sample above the SAL (> 7.50 mg/kg) for PCE was 80 mg/kg at 8E. Samples taken at 3.0 feet showed the broadest spatial distribution of contamination, 20 to 400 mg/kg in six samples. In addition, samples taken at depths greater than 3.0 feet that exceed the SAL ranged between 10 and 800 mg/kg in four samples.

## CONCLUSIONS

The Dragun Corporation has conducted a treatability study to assess the effects of roto-tilling on VOC volatilization from Howe Valley soils. We have reached five conclusions based on the results of this study.

First, most of the PCE volatilized from the spiked Howe Valley soil units (HV1 to HV8) a few hours after the study began. We determined that under static air conditions, PCE volatilizes from a spiked soil unit (200 ppm [w/w]) at an initial rate of 38 mg PCE/m<sup>3</sup> air/minute. In this determination, the volatilization of PCE was not yet limited by the chamber air volume. Thus, when air space is not a limiting factor, the approximately 1000 mg of PCE added to each soil unit would volatilize within 30 minutes.

This conclusion indicates that at the Howe Valley Site, where air space is unlimited, VOCs in soil macropores and in soil air would volatilize rapidly upon exposure to the atmosphere.

In addition, this conclusion is supported by the recent findings of Donaldson et al. (1992) and Kempton et al. (1992). These studies concluded that VOCs volatilize rapidly from soils under ambient and roto-tilling conditions.

Second, low concentrations of PCE volatilize from the soil at a relatively lower rate. It appears that PCE, which had been adsorbed onto soil particle surfaces and trapped in soil micropores, moves into soil macropores and soil air over time. The daily recordings of chamber air VOCs reflect the release of PCE from soil particle surfaces and micropores to soil air, then into the atmosphere.

This conclusion is supported by the recent findings of Kempton et al. (1992). This study reported findings which are similar to this second conclusion.

Third, increasing the number of chamber air turnovers each day also increased the amount of PCE volatilization from the soil unit as new equilibrium states were reached. Chamber air turnovers improve the simulation to site conditions where the air is constantly moving and exchanging at the air/soil interface. This conclusion indicates that at the Howe Valley Site, where air space is unlimited and the air at the air/soil interface is constantly moving, continuous volatilization of VOCs from the soil will occur.

Fourth, the volatilization of PCE is more rapid in low-moisture soil than in high-moisture soil. This conclusion is opposite that of Donaldson et al. (1992), and is most likely due to differences in the soil characteristics. When water was added to the Howe Valley soil, lumps formed in the high-moisture soil units, which caused less soil and soil air to be exposed to the atmosphere, thus decreasing PCE volatilization rates.

Fifth, the results of this study show that roto-tilling should release VOCs from Howe Valley soils. VOC concentrations in roto-tilled soils should reach soil action levels (SALs) in a very short time period.

## **GENERAL DESCRIPTION OF THE TREATABILITY STUDY**

The protocol for the treatability study is based upon the principles and practices discussed in Aurelius and Brown (1987), Dragun (1988), Farmer et al. (1973), Goring and Hamaker (1972), and Jury et al. (1980). The study was conducted at The Dragun Corporation's Environmental Fate and Treatability Laboratory, 30445 Northwestern Highway, Suite 260, Farmington Hills, Michigan, 48334.

Mixed and sieved soil from the Howe Valley Site was placed in open-top, 8.5-liter glass containers. Initial soil moisture by volume was ambient (23%) or high (34%). The treatability study utilized two soil moistures (at the USEPA's request) to simulate the extreme moisture conditions (dry, or following heavy rains) which could exist at the site in the summer months.

The glass containers with soil (containing VOCs) were placed into 100-L enclosed chambers maintained at room temperature (72°F). The selection of temperature is based on the mean summertime temperature at the site.

Two chamber humidities were proposed for the study. Set-up studies using commercial potting soil indicated that ambient chamber air would possess low humidity (< 30%). With the addition of pan evaporation, high chamber humidity (> 75%) could be maintained. However, with the use of site soil, the evaporation of water from soil caused the humidity in all chambers to remain above 90% throughout the study. Since high evaporation rates would occur under low relative humidity (RH) conditions, the high humidity levels in the chambers represented a worst-case scenario.

Once a day, the soil was mixed in a manner which simulates roto-tilling in the field. In addition, soils from each container were sampled periodically and analyzed for VOCs by an independent analytical laboratory.

Additional studies were conducted to determine the initial rate of PCE volatilization from soil. In these studies, a soil unit spiked with PCE was placed in a chamber and the chamber air was monitored for VOC content over several hours.

The Howe Valley study endpoint was defined as: (a) the attainment of a soil VOC concentration equal to or below the soil action level, and/or (b) the determination of the rate of volatilization of the VOCs. A study length of one month was anticipated, based on equations developed by Jury, et al. (1983, 1984a, 1984b, 1984c) which estimate diffusion rates and volatilization losses of organic chemicals from soil.

The study was conducted in accordance with The Dragun Corporation's Chemical Hygiene Plan (Appendix G) and Health and Safety Program (Appendix H). Record keeping and data analysis followed the Data Management Plan (Appendix I).

## **DEFINITIONS**

The term "chamber" refers to a plastic-lined steel refrigeration unit with a hinged door, which has an internal volume of approximately 100 liters.

The term "relative humidity" (RH) is the ratio of the amount of water vapor in the air compared to the maximum amount of vapor which could exist in the air at the same temperature.

The term "soil unit" refers to one 8.5-liter glass container of soil.

The term "duplicate soil unit" refers to the use of two soil units which contain the same materials and are treated identically. Statistical analyses require the use of duplicate or replicate units. Because this study utilizes duplicate units, sufficient data will be generated to perform the appropriate statistical evaluations for this study.

## **SPECIAL MATERIALS**

- Soil from the Howe Valley Site containing no VOCs.
- Reagent grade tetrachloroethene (PCE), molecular weight of 165.83, which was added to the soil units at the initiation of the study.
- Reagent grade methanol, which was utilized as a solvent for the addition of PCE to the soil units.
- 12" x 8" x 5.5" (8.5 L) open-top glass containers.
- Plastic-lined steel refrigeration units with a hinged door and an internal volume of approximately 100 L.
- Temperature/RH probe and meter (Cole Parmer TriSense, model 37000-50).
- Electric-powered, small-batch mixer with variable speed gear drive, stainless steel drive shaft, enamel-coated steel rotors, and stainless steel mixing bowls.
- Fume hood.

- 40-ml glass sample containers with teflon-lined screw caps. These contained the soil samples which were sent to an independent analytical laboratory for soil VOC analyses.
- Photoionization detectors (PIDs). An HNU, model Hw-101, with an 11.7 eV lamp was utilized for the detection of PCE. A Photovac Tip I with a 10.6 eV lamp was also used for general measurements and for the initial volatilization rate studies. The calibration gas was isobutylene.

## ASSUMPTIONS

Biodegradation of the soil VOCs was not assessed in this bench-scale study. However, microbiological activity within the soil units is most similar to that occurring in the soil-groundwater system at the site. Therefore, microbiological activity will have a similar influence on the soil chemistry in the soil units as in the soil system at the Howe Valley Site.

The mixing of the soil is representative of the roto-tilling occurring onsite. The mixing procedure takes into account speed, revolutions per second (rps), soil depth, and frequency of soil turnover.

The proposed RH range within the chambers represents the RHs that can exist at the subject site. The soil moisture contents maintained in the soil units represent the extremes which can occur at the subject site.

The bulk density of roto-tilled field surface soil at the Howe Valley Site is similar to that of typical field soil, which is about 1.2 g/ml.

## PROCEDURES

An overview of the experimental protocol and procedures for the 30-day study is presented in Figure 2. The following paragraphs describe in greater detail the procedures which were conducted during this treatability study.

### Site Soil Preparation Procedures

Approximately 20 gallons of clean soil were collected at the Howe Valley Site from location C-13 (11W, 160N) (see Figure 1). The soil was dug with a decontaminated shovel, sieved through a 0.25 inch aluminum wire screen, then placed in clean, five-gallon containers. A

custody seal was placed on each container, and chain-of-custody forms were completed. The soil was shipped to The Dragun Corporation by commercial carrier.

### Preliminary Procedures

Following receipt of the Howe Valley soil by The Dragun Corporation, soil moisture content was determined. Prior to initiation of the study, five 50-g samples of soil were oven-dried overnight at 80°C. The dried samples were weighed, and the percent moisture by volume was calculated. A bulk density of 1.2 g/ml, common for topsoil, was used for this determination.

The calculated average soil moisture content (23%) was used as the uniform moisture content of the Howe Valley Site soil. Throughout the study, additional determinations were made to monitor the soil moisture content.

Eight soil units were used in this one-month study. To prepare the soil units, a 6.5-liter volume of soil from the Howe Valley Site was transferred into each glass container. The loosely spread soil filled approximately 3/4 of the container. Each soil unit was weighed (before the addition of water), and an average weight of 4.3 kg per unit was calculated (see Table 1).

Following the soil unit weight determination, soil moisture content by volume was adjusted. The initial soil moisture content (23%) of the Howe Valley soil was used in four "low-moisture" soil units. Tap water was added to four other units to obtain an initial soil moisture content of 34% (see Table 1). Tap water was utilized because the chemical components of tap water do not interfere with VOC volatilization from the soil.

Each soil unit was then spiked with PCE and placed in a chamber. To simulate onsite conditions, the initial work plan suggested that either low (< 30%) or high (> 75%) RH be maintained in the chambers. Four chambers held pan-evaporation containers to maintain high RH. The other four chambers (low RH) were allowed to maintain ambient conditions in the air-conditioned laboratory (see Table 2). The air was not continuously circulated or vented in any of the chambers.

Student's T-test was used to determine if differences between the study conditions were significant. Information from replicate conditions was averaged, and significance was tested at the 0.05 level of confidence.

### Spiking Procedure

The Howe Valley soil used in this study contained no VOCs; therefore, all soil units were spiked with PCE at a concentration of 200 ppm weight/weight (w/w). PCE was chosen as the spiking chemical because it is the most difficult of the four primary VOCs at the Howe Valley Site to desorb from soil.

It was expected that volatilization of the PCE would begin immediately after the spike was added, as the vapor pressure of PCE is relatively high. The PCE spike concentration, 200 ppm, was chosen because it is above the SAL of all the VOCs of concern at the Howe Valley site. Also, the PCE spike was expected to provide a significant PCE soil concentration at the first sampling event.

PCE was diluted in methanol before it was added to the soil. Approximately 1.1 g of PCE (density of 1.6 g/ml) in 50 ml of methanol was added to each soil unit while it resided in the fume hood. The final concentration in each soil unit was actually 255ppm (see equation A below). The solution was poured into a trough in the soil unit, which was quickly covered with soil after PCE addition. The soil was not mixed at the time of spiking to prevent immediate volatilization of the PCE. The soil unit was then transferred to the appropriate chamber.

Equation A:

$$\frac{1.1 \text{ g PCE}}{4.3 \text{ kg soil}} = \frac{0.255 \text{ g PCE}}{\text{kg soil}} = \frac{255 \text{ mg PCE}}{\text{kg soil}} = 255 \text{ ppm PCE in each soil unit}$$

#### Temperature and RH Measurement Procedures

The temperature and RH of chamber air were measured at 6 hours, 12 hours, 24 hours, and daily thereafter with an RH/temperature probe and meter. To obtain the measurements, the probe was inserted into the chamber through a side or top port. The probe and meter were operated according to the manufacturer's instructions.

#### VOC Measurement Procedures

Using a PID, VOC measurements in chamber and soil air were taken daily in all eight soil units. In addition, VOC measurements were used to determine the initial PCE volatilization rate. The PID was calibrated prior to each set of data sampling according to the manufacturer's specifications. Additional calibrations were conducted during and after some data set collections to verify that no calibration drift had occurred.

The PID was calibrated using isobutylene gas. The response factor between isobutylene and PCE is 1.04; adjustments to VOC measurements were not made as there is little response difference between the two compounds. To account for interference of water vapor in the PID measurements, a background measurement was determined under RH conditions similar to those in the chambers and subtracted from the chamber VOC measurement.

The VOC concentrations of chamber air and soil air (air between soil particles) were measured with a PID at 6 hours, 12 hours, 24 hours, and daily thereafter, according to the USEPA approved work plan. The VOC measurements were utilized as a daily measurement

of the study progress, as the actual soil concentration of PCE was analyzed from soil samples.

The chamber air was measured through a side or top port in the chamber. For soil air measurements, the soil units were placed in the fume hood. The PID probe was held just above the soil surface in the low-moisture soil units and between soil lumps in the high-moisture soil units to obtain VOC readings. Three soil air readings were taken and averaged for the daily determination.

Chamber air VOC measurements were also taken to determine the time needed to reach equilibrium between PCE in the soil and in the chamber air. VOC measurements were taken over an eight hour period in each chamber. Following the determination of the equilibration time (six hours), a chamber air purge procedure was initiated on day 14. The chamber was opened twice a day; in the morning at mixing time and at the end of the day. This procedure was initiated to increase the amount of PCE released from the soil units each day.

#### Soil Mixing Procedure

Following temperature/RH and VOC determinations, the soil was mixed. Mixing was conducted within a fume hood. For each low moisture soil unit, the soil was divided into three batches. Each batch was transferred to a small-batch mixer and mixed for seven seconds. Afterwards, the soil was transferred to the glass container and returned to the chamber.

The mixing parameters simulated the mixing action of a roto-tiller operating in the field at a 0.75 ft/sec tractor speed, a tine shaft speed of 3.33 rps, and a cutting circle diameter of 1.5 ft. It was calculated that mixing of soil for approximately seven seconds with a mixer blade speed of one rps is similar to the field mixing of soil at the site. Figure 3 presents the calculations which determined this time period.

Soil from the high-moisture units was mixed by hand. After addition of water to the soil, sticky lumps of 2 to 6 cm formed during the first mixing episode. The mixer did not function adequately with this soil texture. Therefore, the soil was transferred to a bucket in the fume hood, then mixed to provide uniform turnover and partial breakdown of the soil lumps present in the unit. After mixing, the soil was transferred back into the glass container and returned to its chamber.

The amount of volatilization of the PCE during transfer of the units to and from the mixer should be minimal compared to volatilization which occurred while mixing the soil. The main reason for this is that the surface area of soil exposed to air during transfer is small.

#### Soil Sampling Procedures

Duplicate soil samples were obtained from each soil unit before the PCE spike (for background VOC levels), at 6, 12, 24, 48, and 72 hours, and every two or three days

thereafter according to the USEPA approved work plan. One sample was sent to the analytical laboratory for VOC analysis and the other was retained by The Dragun Corporation's laboratory as a back-up sample. The back-up sample was retained until the analytical laboratory had successfully extracted the soil sample.

Soil samples were placed in 40-ml glass sample containers with teflon-lined screw caps. Soil was collected from all areas of the soil unit using a stainless steel scoop. A sufficient amount of soil was placed in each sample container so that no headspace existed in the container. Soil sampling procedures, which are presented in the USEPA manual describing standard operating procedures (USEPA 1991), were utilized.

The analytical laboratory (NET Midwest, Inc., Auburn Hills, MI) analyzed the samples for VOCs using gas chromatography. Sample transfer followed chain-of-custody protocols. USEPA Method 8010 was used. In addition, one sample was analyzed with USEPA Method 8260 to verify the presence of PCE with mass spectroscopy. Quality assurance/quality control (QA/QC) procedures are presented in Appendix F.

#### PCE Initial Volatilization Rate Procedures

A small study was conducted to determine if PCE volatilized rapidly upon addition to a soil unit. The study (soil unit HV9) utilized the previously described spiking procedures, but on a smaller scale. A Photovac Tip I PID instrument with a 10.2 eV lamp was used. Using this instrument, negligible (< 1 ppm) methanol was detected with the study conditions.

Clean Howe Valley soil (100 g, ambient moisture) was transferred into glass containers and spiked to a concentration of either 100 or 200 ppm (w/w) PCE (dissolved in methanol) in the fume hood. VOC readings were taken just above the soil surface over a two-minute time period. A soil sample (40-ml container) was then taken for laboratory analysis. Just before the vial was closed, an additional VOC determination was made at the mouth of the vial.

A second information study was also conducted. Two 40 ml VOC sample vials were filled with Howe Valley soils. The soils were spiked with 200 ppm PCE (w/w) in methanol while in the vial. VOC readings were taken at the mouth of the vial with the PID prior to capping. The soil in the sample vial was then analyzed for PCE content.

The small volatilization studies described above suggested that PCE volatilized rapidly upon addition to the soil unit. Therefore, additional studies were conducted to determine the PCE volatilization rate using a full-size soil unit in a closed chamber (soil unit HV10). A soil unit containing 3.4 kg of Howe Valley soil was spiked to a concentration of 200 ppm (w/w) PCE in methanol. The solution was added to the soil unit (as outlined in the spiking procedure) while it resided in the 100-L chamber. The chamber was quickly closed and VOC readings were taken through a side port with the Photovac Tip I PID. VOC readings were taken over a three-hour time period.

In a separate PCE initial volatilization rate study (soil unit HV11, 3.2 Kg soil), PCE concentrations in air were measured over a two-hour time period. The chamber door was

then opened for one minute, and afterwards, PCE concentrations in air were measured for an additional two hours. This procedure was repeated to obtain data on the time needed to attain equilibrium concentrations of PCE in chamber air over three consecutive time periods.

## RESULTS AND DISCUSSION

### Soil Moisture

It was determined that the Howe Valley Site soil had a moisture content of 23% volume/volume (v/v). Four units (HV1, HV2, HV5, and HV6) were filled with this soil and the moisture was maintained in ambient conditions. The soil moisture in these units decreased to an average of 19% over the course of the study (see Table 3).

Water was added to the other four soil units (HV3, HV4, HV7, and HV8) to obtain a soil moisture content of 34% (see Table 1). Upon initial mixing, this soil formed lumps which were 2 to 6 cm in diameter. Because the formation of these lumps caused mixing difficulties, additional water was not added to these soil units during the study. The soil moisture content of these units decreased to an average of 27% during the study (see Table 3).

### Temperature and RH

Chamber temperatures remained relatively steady for the length of the study and ranged between 70 and 77° F. The RH of all eight chambers was greater than 90% on all days. Because of water evaporation from the soil in the four "low" humidity (no pan evaporation) chambers (HV1, HV3, HV5, and HV7), it was not possible to maintain the chamber RH at the suggested low setting (< 30%). Since high evaporation rates would occur under low relative humidity (RH) conditions, the high humidity chambers represented a worst-case scenario. This reduced the conditions studied to two: high- and low-moisture soil units. The daily temperature and RH measurements are reported in the Daily Data Reports (see Appendix C).

### VOC Determinations

VOCs were measured in the chamber air to monitor the daily progress of the study. Figures 4a to 4h present chamber air VOC measurements for each unit during the study. In addition, the chamber air VOC concentrations are presented in the Daily Data Reports (see Appendix C).

VOCs were not detected in the chamber air at either 6 or 12 hours. This observation suggests that much of the PCE volatilized during, or shortly after, its addition to the soil units while in the fume hood. At 24 hours (day 2), VOCs in the chamber air can be

measured. This observation suggests that substantial soil mixing is needed when soil PCE levels are low in order to release a measurable amount of PCE.

At 24 hours, and for the next 10 days (in all chambers), VOCs were detected at levels between 10 and 30 ppm. These data suggested that some of the PCE was adsorbed to the soil particles after spiking. These chamber VOCs were generated from the release of PCE adsorbed to soil particle surfaces and micropores, to soil air, then into the atmosphere. Over the remainder of the study, a gradual decrease of the VOC concentration, to an average of 7 ppm in chamber air, was detected.

Soil VOC measurements were conducted on a daily basis to monitor the VOC amounts in the soil air. Soil VOC measurements taken during the study are presented in Figures 5a to 5h. These soil air VOC measurements are also recorded in the Daily Data Reports (see Appendix C).

Very low VOC measurements (< 1 ppm) were initially detected at the soil surface for the first day of the study. There was a gradual increase in soil VOCs over the next five days. From day 6 to day 11, soil air VOCs ranged, in general, between 10 and 25 ppm. Again, these data suggest that some of the PCE was adsorbed to the soil particle surfaces and micropores, then released. As the amount of PCE adsorbed to the soil decreased, a gradual decrease in soil VOC concentration was detected over the remainder of the study.

Although it is expected that the chamber air and soil air VOC concentrations would be similar at equilibrium, the soil air concentrations are generally lower. This is an artifact of the soil VOC measurement, as the soil unit was removed from the chamber and placed in the fume hood prior to the VOC measurement.

To gain more information about the system, the length of time necessary to attain a VOC equilibrium state in chamber air was determined. Additional chamber air VOC measurements were conducted in each chamber over six- to ten-hour time frames (see Table 4). In each chamber, an equilibrium state was obtained by six hours.

Once the chamber air VOC equilibrium level is obtained, additional quantities of VOCs will not be released from the soil. Therefore, to simulate a situation more like the site air environment (unlimited air exchange at the soil/air interface), and thus increase soil VOC volatilization, an additional equilibrium state was created each day. To create the additional equilibrium state, the chambers were opened twice a day for several minutes. The first opening occurred when the soil was mixed, and the second occurred at the end of each working day (starting on day 14). It was believed that this minor change in the protocol would decrease the overall time needed to complete this study.

#### PCE Concentrations in Soil Determined by Gas Chromatography and Mass Spectroscopy

Soil from the spiked soil units was analyzed for PCE content throughout the study. These data were collected to determine if the soil action levels were achieved, and also to determine the rate of PCE volatilization from the soil.

The soil samples were analyzed by an independent analytical laboratory, NET Midwest, Inc., for VOCs (USEPA Methods 8010 or 8260). The data from NET analysis are presented in Appendix E. This data is summarized in Table 5. For sample sets 1 to 10, the detection limit was set at 100 ppb; for the remainder of the samples, the limit was set at 20 ppb. The original detection limit was set at 100 ppb because it was anticipated that high levels of PCE would be present in the soil in the beginning of this study.

Soil from each unit was analyzed prior to addition of the PCE spike to determine background levels of VOCs. No VOCs were detected in the soil shipped from the Howe Valley Site (Table 5, Background).

At six hours following the PCE spike, PCE was detected in the soil at levels between 200 to 1000 ppb (Table 5). Analysis of sample HV1-2 by gas chromatography/mass spectroscopy confirmed the presence of PCE in the soil samples. The concentrations of PCE were below the soil action level ( $> 7.5$  mg/kg) in all samples at the six-hour sampling period, and throughout the remainder of this portion of the study.

Soil PCE concentrations declined during the study to non-detect levels (see Table 5). Because of the variability of the data for each soil unit, it is not possible to determine a rate of volatilization from the soil data. However, a comparison between the high and low moisture soils was made.

For each soil unit, the day that PCE was last detected in the soil was determined. The mean and standard deviation of the "last day" for the four high-moisture (HV3, HV4, HV7, HV8) and four low-moisture (HV1, HV2, HV5, HV6) units were then calculated. The "last day" mean and standard deviation for the high- and low-moisture soil units is  $14.75 \pm 7.89$  days and  $1.45 \pm 1.30$  days, respectively. Student's T-test was then applied, and the two means were determined to be significantly different at the 0.05 level of confidence. It is concluded that soil PCE concentrations decreased more rapidly in the low-moisture soil than in the high-moisture soil.

### Results of Volatilization Rate Studies

The decrease of PCE concentrations in soil from 200 ppm to less than 1 ppm at the initial sampling event (six hours), suggested that the bulk of the PCE had volatilized at the beginning of the study. Although not outlined in the study work plan, additional experiments were conducted to determine whether the PCE had indeed volatilized shortly after addition to the soil units. To test this hypothesis, a series of three studies was conducted to measure the initial volatilization rate of PCE from the soil units. The results are discussed in the following paragraphs.

First, two small studies were conducted to examine if PCE volatilized rapidly upon addition to the soil. Howe Valley soil (100 g) was spiked with 100 or 200 ppm (w/w) of PCE in a fume hood (soil unit HV9). PCE was detected in the air directly above the soil with a PID. Table 6 shows that for samples 1 through 4, PCE in soil air was detected at levels up to 90 ppm over a 1.5 minute time period. Additional PCE was detected from the soil after the soil

was collected in the sample vial. Analysis of the soil for PCE content revealed concentrations of only 27 to 130 ppb. This is a decrease of PCE soil concentration from 100 or 200 ppm to 0.13 ppm or lower. These data support the idea of rapid PCE volatilization from soil.

In the second small study, 200 ppm PCE (w/w) was added directly to soil in duplicate sampling vials (see Table 6, samples 5 and 6) in a fume hood. High VOC concentrations (greater than 285 ppm) were detected at the mouth of the vial just prior to capping. Again, soil analysis detected greatly reduced concentrations (6.9 ppm and 9.7 ppm) of PCE in these samples.

Second, based on the information from the small studies, an experiment was designed to determine the initial volatilization rate for PCE from a soil unit. The volatilization rate of PCE from a soil unit in a closed chamber was determined in two experiments. After the addition of 200 ppm (w/w) PCE to the soil unit in a chamber, the PCE concentration in chamber air was measured using the PID until equilibrium was reached (see Figures 6a and 6b). Equilibrium occurred at approximately two hours. The amount of PCE in the chamber at two hours is 179 for HV10 and 355 for HV11. The initial volatilization rate for the two experiments (an average of 5.6 ppm/minute) was determined over the first 25 minutes by linear regression analysis and is presented in Figures 7a and 7b. The chamber air VOC concentrations and linear regression analysis are also recorded in the Volatilization Rate Study Data Report (see Appendix D).

Third, in the second volatilization rate study (soil unit HV11), additional data was collected to determine the time needed to attain equilibrium concentrations of PCE in chamber air over three consecutive time periods. The first equilibrium level was 355 ppm (see Appendix D; First Run). After opening the chamber for one minute between sampling periods, lower chamber air PCE levels were attained in the subsequent equilibrations (see Figure 8 and Appendix D). The lower equilibrium levels reflect the decrease of PCE concentration in the soil unit over time.

The average initial volatilization rate and equilibrium levels of PCE were converted from ppm to mass using the equation in Figure 9. The initial PCE volatilization rate (average 5.6 ppm/minute) converts to 38 mg/m<sup>3</sup> air/minute. The average amount of PCE in the 100-L chamber two hours after spiking (278 ppm), converts to 189 mg PCE/100-L chamber.

## SUMMARY

A treatability study was conducted by The Dragun Corporation to examine the effects of roto-tilling on VOC volatilization from Howe Valley soils. The conclusions are summarized in the following paragraphs.

Most of the PCE volatilized from the spiked Howe Valley soil units a few hours after the study began. When air space is not a limiting factor, an initial rate of PCE volatilization

from spiked soil units (200 ppm w/w) was determined as 38 mg PCE/m<sup>3</sup> air/minute. This indicates that at the Howe Valley site, where air space is unlimited, VOCs in the soil air and macropores should volatilize rapidly upon exposure to the atmosphere.

Increasing the air turnovers in the chambers increased the amount of PCE released into the chamber each day. Although the PCE in soil at lower concentrations volatilizes at a relatively lower rate, the adsorbed PCE continues to be released. This indicates that at the site, where air exchange is unlimited at the soil/air interface, VOCs will volatilize continuously.

PCE volatilization was decreased by a high moisture content of the soil. Because the soil formed lumps when mixed, less soil and soil air was exposed to the atmosphere, and the PCE volatilization rate was decreased.

Overall, the results of this study show that roto-tilling should release VOCs from Howe Valley soils. VOC concentrations in roto-tilled soils should reach soil action levels (performance goals) in a very short time period.

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9	Calculations to Convert PPM in Air to Mass per Volume

Figure 1. Howe Valley Site

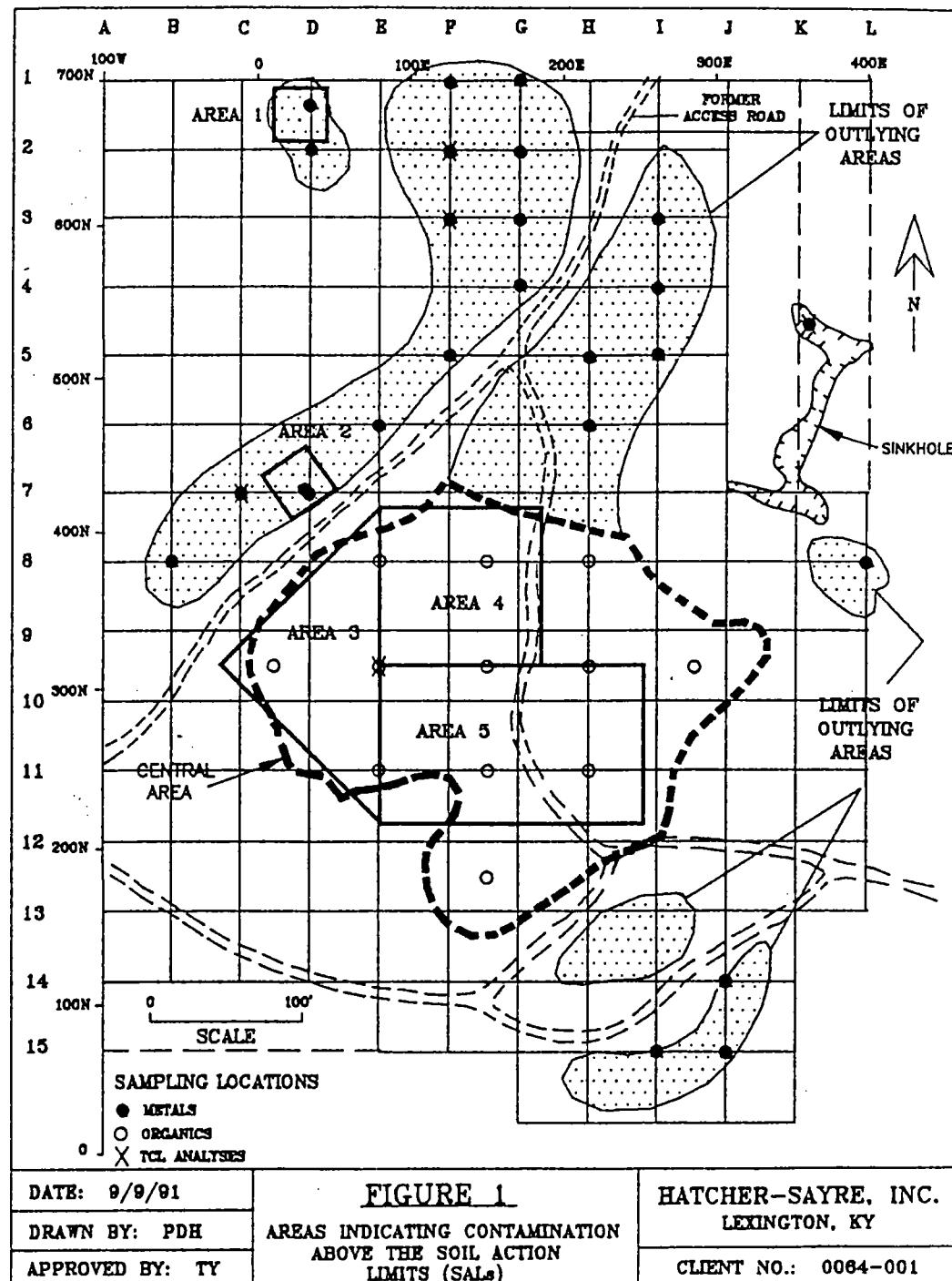


Figure 2. Overview of Experimental Protocol for Bench-Scale Volatilization Study of Howe Valley Soil

A. Howe Valley Site

1. Field preparation of soil.
2. Shipment of soil to laboratory.

B. Soil Unit Preparation

1. Analyze soil for VOC concentrations.
2. Aliquot soil to soil-unit.
3. Adjust soil moisture levels.
4. Add PCE spike to soil-unit.
5. Add soil-unit to appropriate chamber.

C. Data Collection

	<u>Time (hours)</u>	<u>VOCs<sup>1</sup></u>	<u>Mix Soil</u>	<u>Sample Soil</u>
Days 1-3	0	X		
	6	X	X	X
	12	X	X	X
	24	X	X	X
	48	X	X	X
	72	X	X	X
Daily		X	X	
Every 2 to 3 days			X	
Conclusion				X

<sup>1</sup> Measurement of VOCs by photoionization detector

Figure 3. Calculations for Determination of Soil Mixing Time in the Laboratory

PARAMETERS

Tractor speed	=	0.75 feet/second
Cutting circle diameter	=	1.5 feet
Tine shaft speed	=	3.33 revolutions/second
Lab mixer speed	=	1 revolution/second

The typical tractor can pull a rototiller across a field at a speed of 0.75 feet/second. The time,  $t_A$ , needed for the rototiller to be pulled across an imaginary, vertical plane which lies perpendicular to the soil surface is:

$$\begin{aligned} t_A &= (\text{cutting circle diameter})(\text{tractor speed})^{-1} \\ &= (1.5 \text{ feet})(0.75 \text{ feet/second})^{-1} \\ &= 2 \text{ seconds} \end{aligned}$$

During this two-second time period, the number of rototiller revolutions,  $R_R$ , is:

$$\begin{aligned} R_R &= t_A (\text{tine shaft speed}) \\ &= (2 \text{ seconds})(3.33 \text{ revolutions/second}) \\ &= 6.66 \text{ revolutions} \end{aligned}$$

Based on these estimates, the average soil aggregate residing at the base of an imaginary plane, which lies perpendicular to the soil surface, would be rototilled 6.66 revolutions for a two-second time period.

The equivalent time of a laboratory mixer,  $t_{LM}$ , to simulate field rototilling of surface soil at the Howe Valley site is:

$$\begin{aligned} t_{LM} &= R_R (\text{lab mixer speed})^{-1} \\ &= (6.66 \text{ revolutions})(1 \text{ revolution/second})^{-1} \\ &= 6.66 \text{ seconds} \\ &= \text{approximately 7 seconds} \end{aligned}$$

Figure 4a.

Chamber Air VOC Concentration; Soil Unit HV1

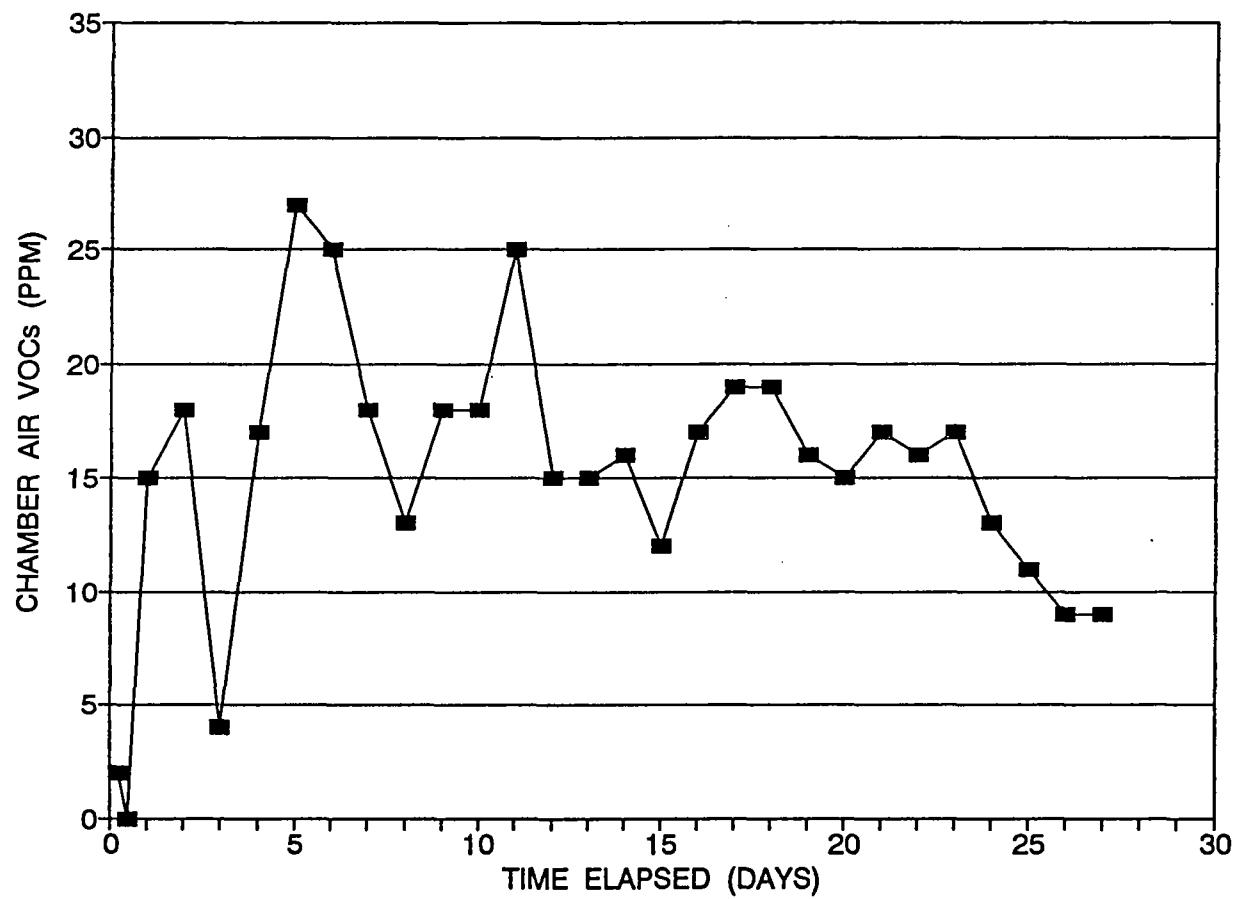


Figure 4b.

Chamber Air VOC Concentration; Soil Unit HV2

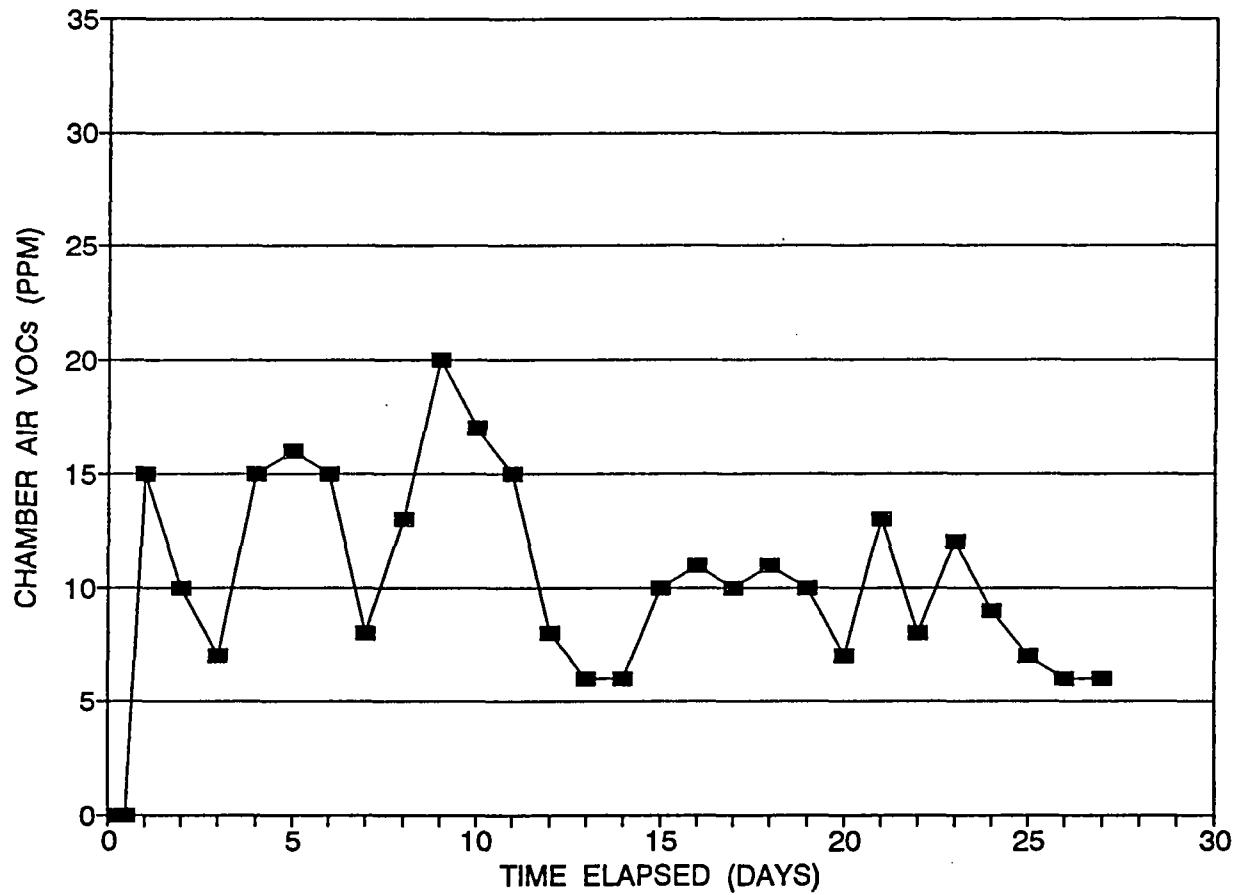


Figure 4c.

Chamber Air VOC Concentration; Soil Unit HV3

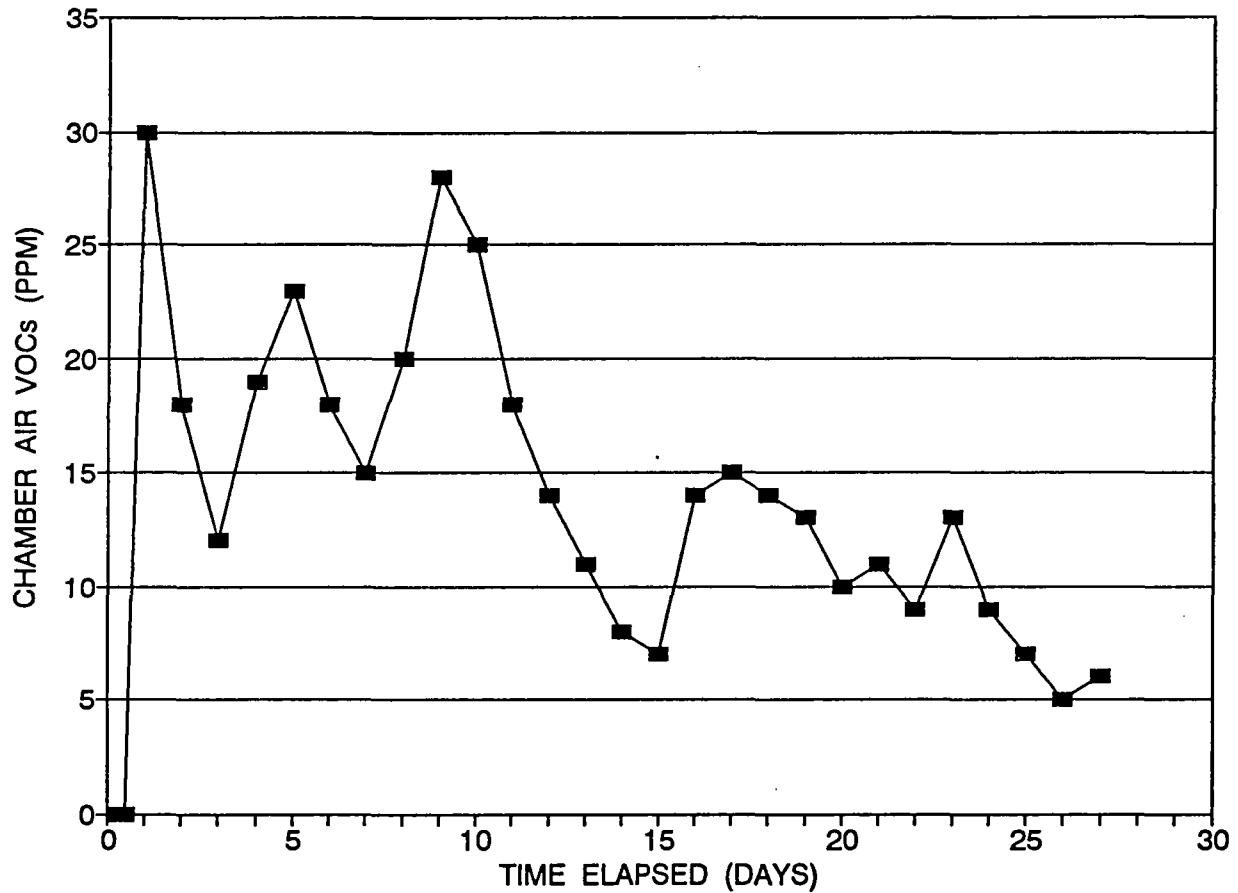


Figure 4d.

Chamber Air VOC Concentration; Soil Unit HV4

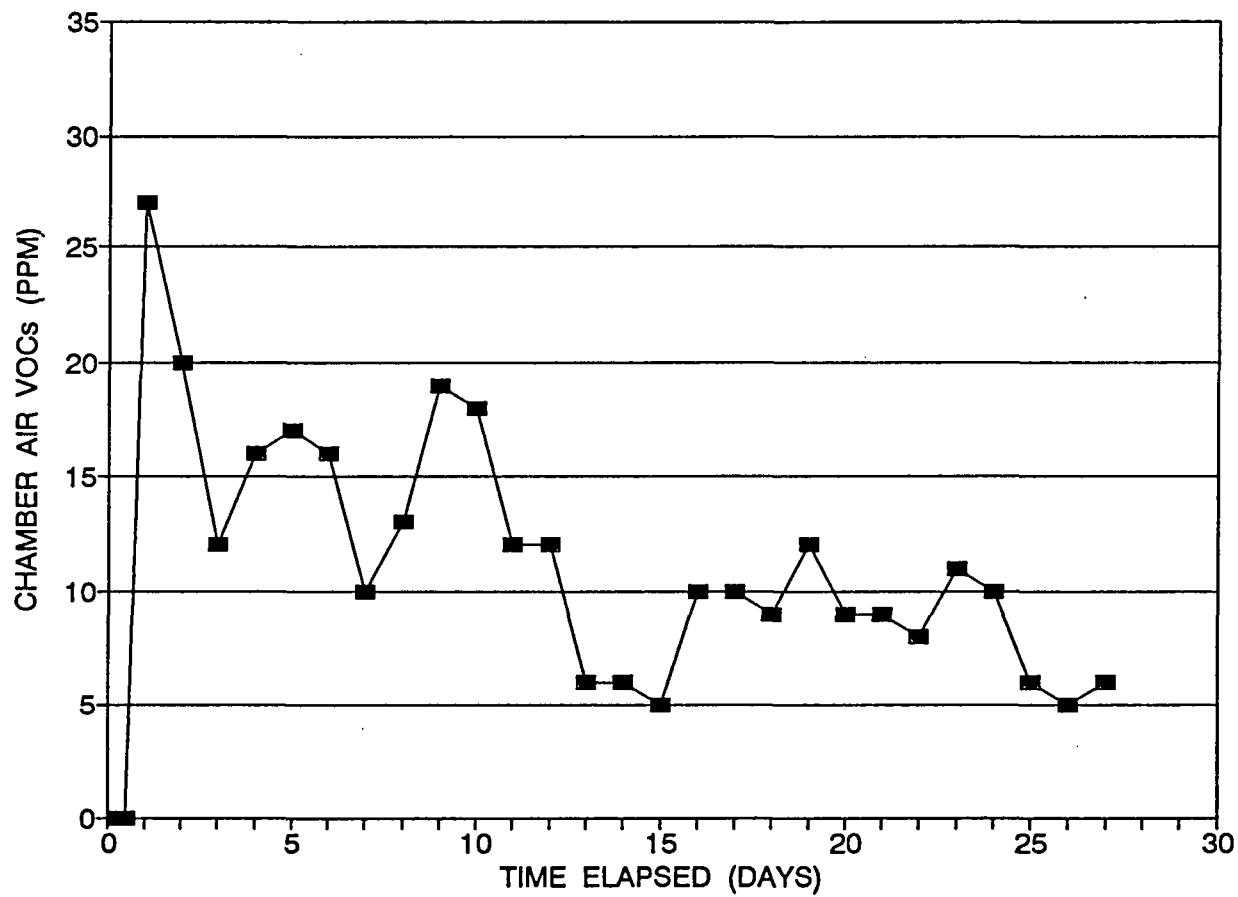


Figure 4e.

Chamber Air VOC Concentration; Soil Unit HV5

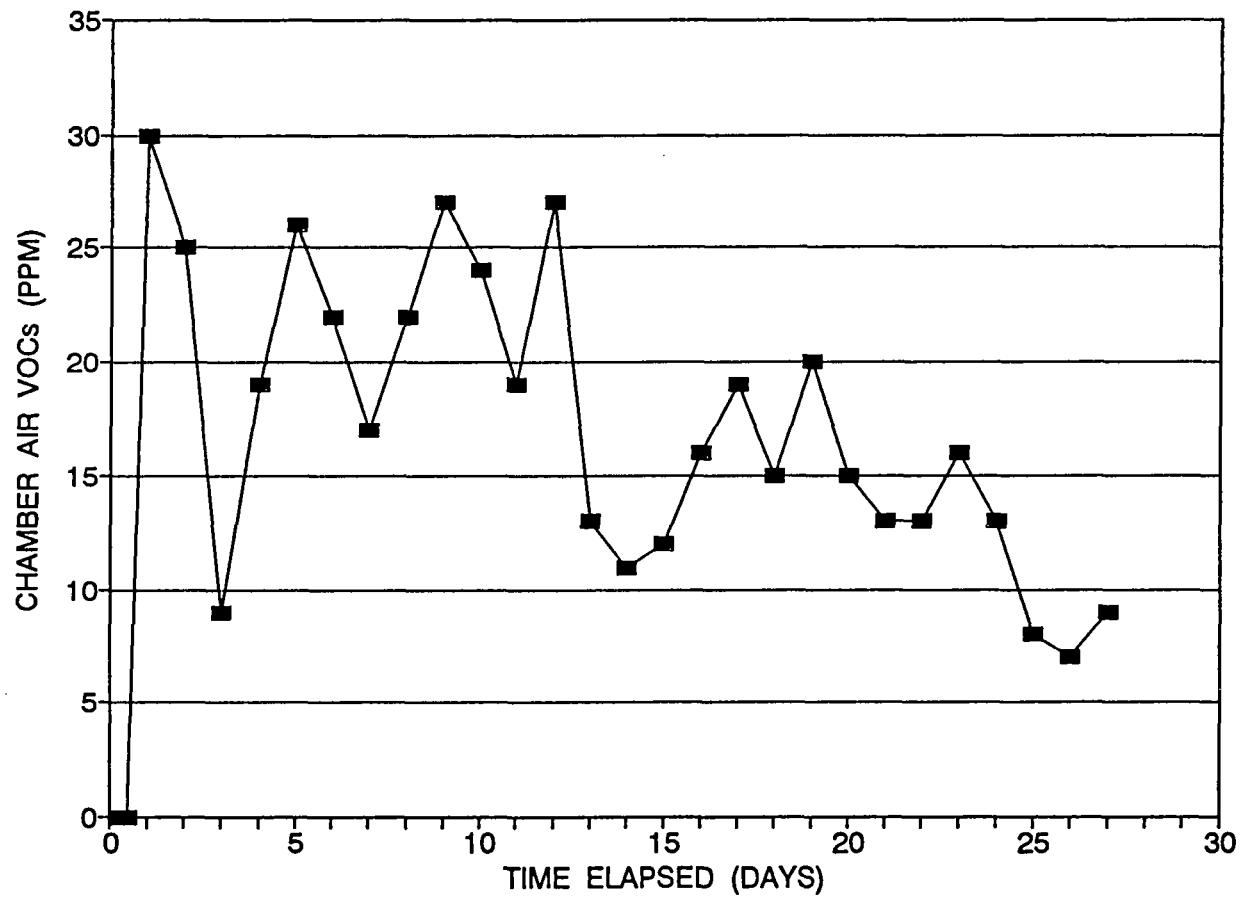


Figure 4f.

Chamber Air VOC Concentration; Soil Unit HV6

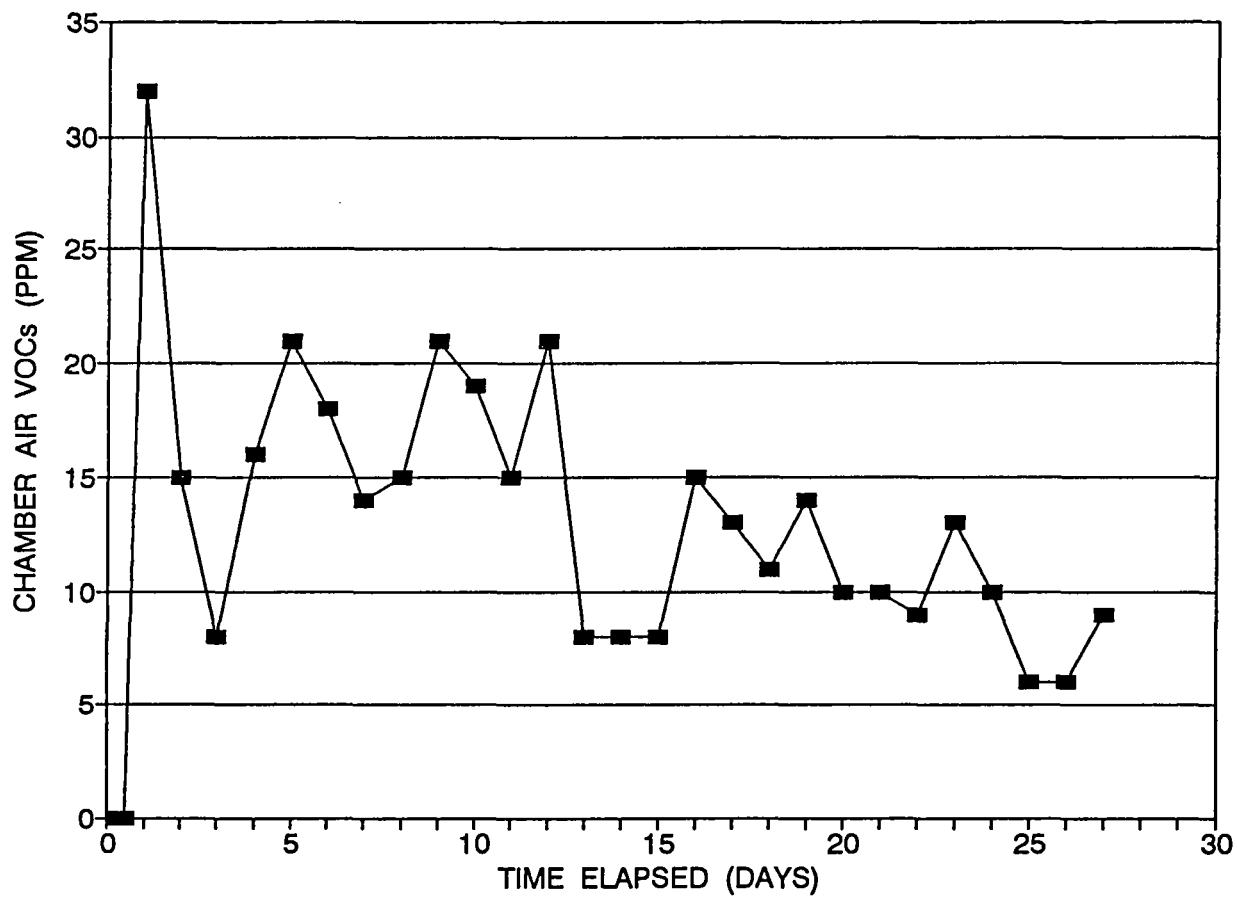


Figure 4g.

Chamber Air VOC Concentration; Soil Unit HV7

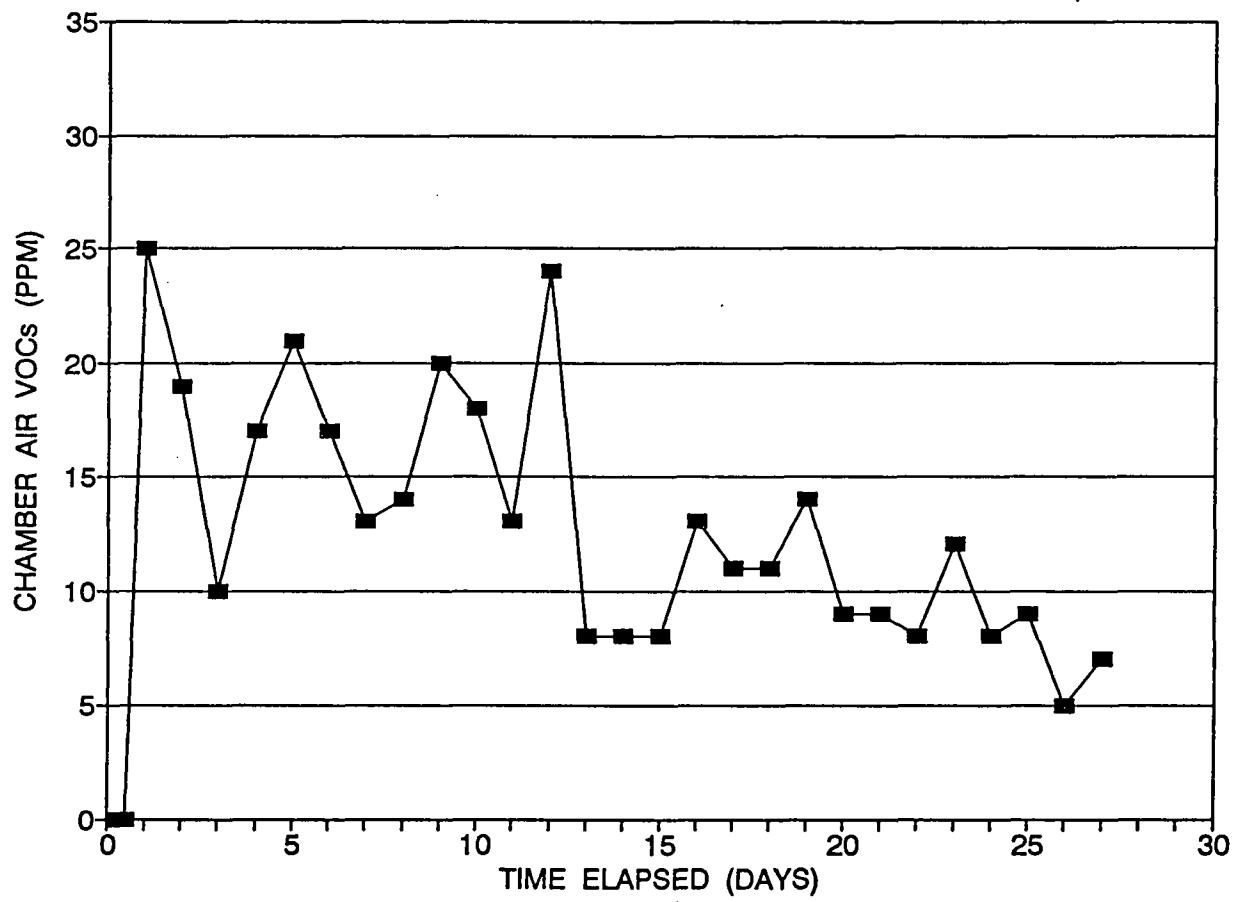


Figure 4h.

Chamber Air VOC Concentration; Soil Unit HV8

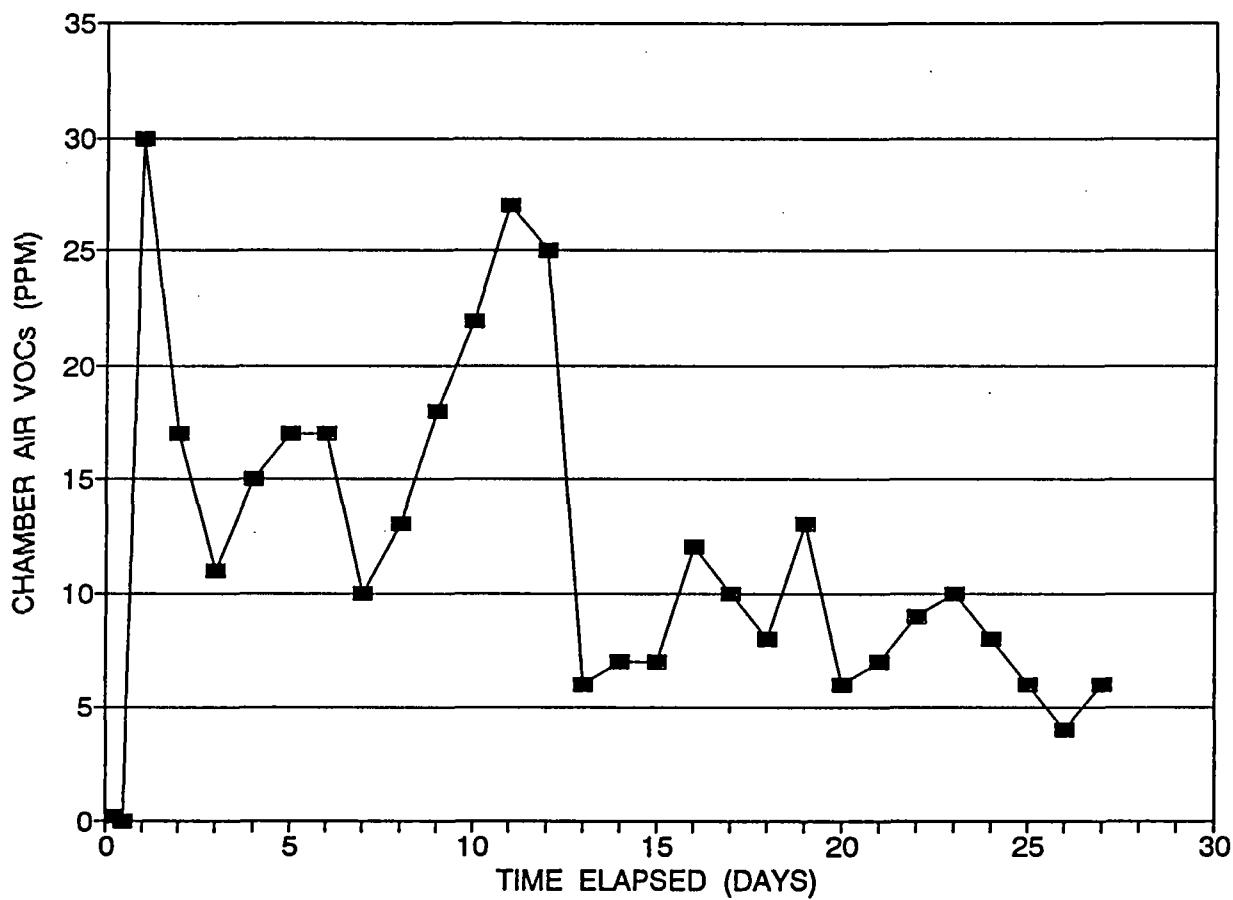


Figure 5a. Soil Surface Air VOC Concentration; Soil Unit HV1

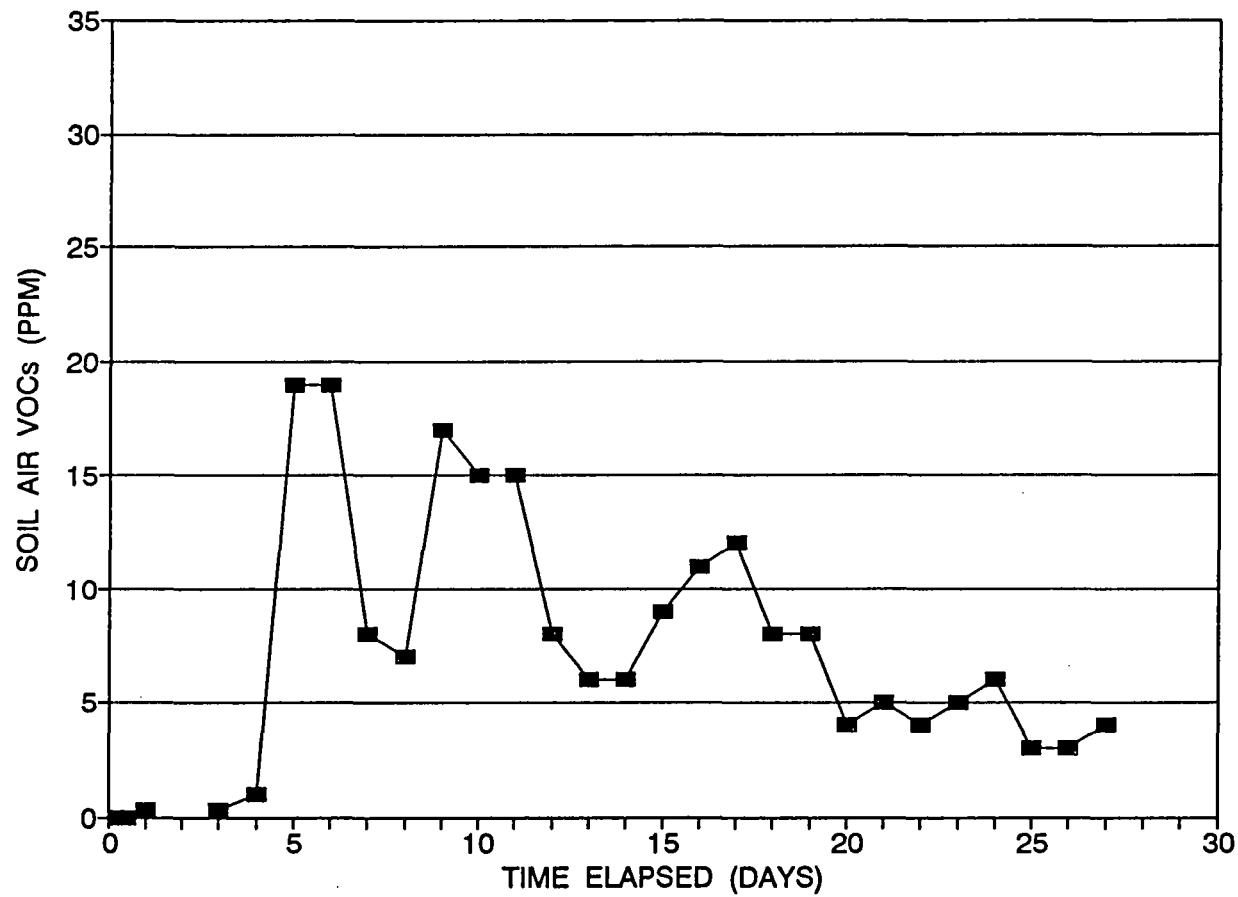


Figure 5b.

Soil Surface Air VOC Concentration; Soil Unit HV2

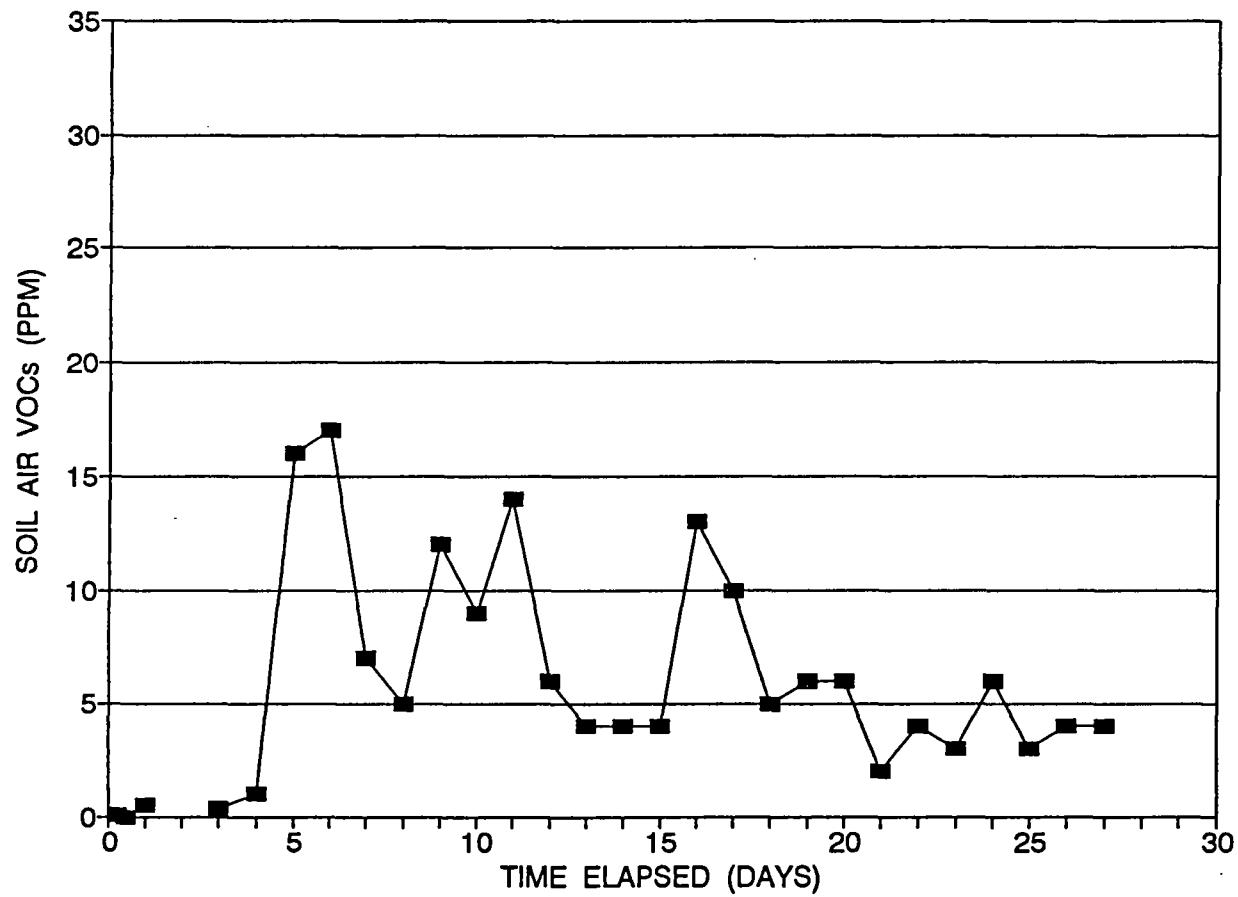


Figure 5c.

Soil Surface Air VOC Concentration; Soil Unit HV3

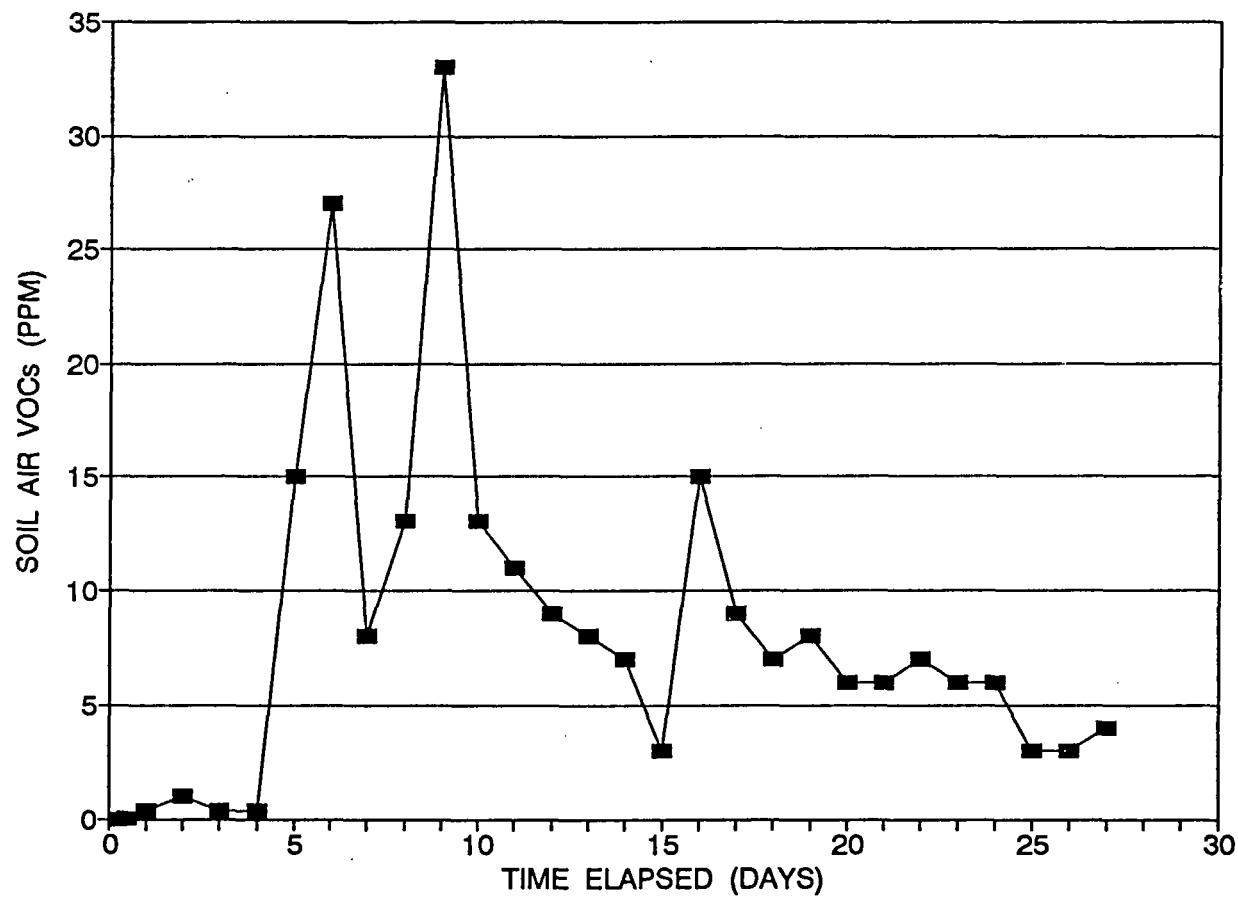


Figure 5d. Soil Surface Air VOC Concentration; Soil Unit HV4

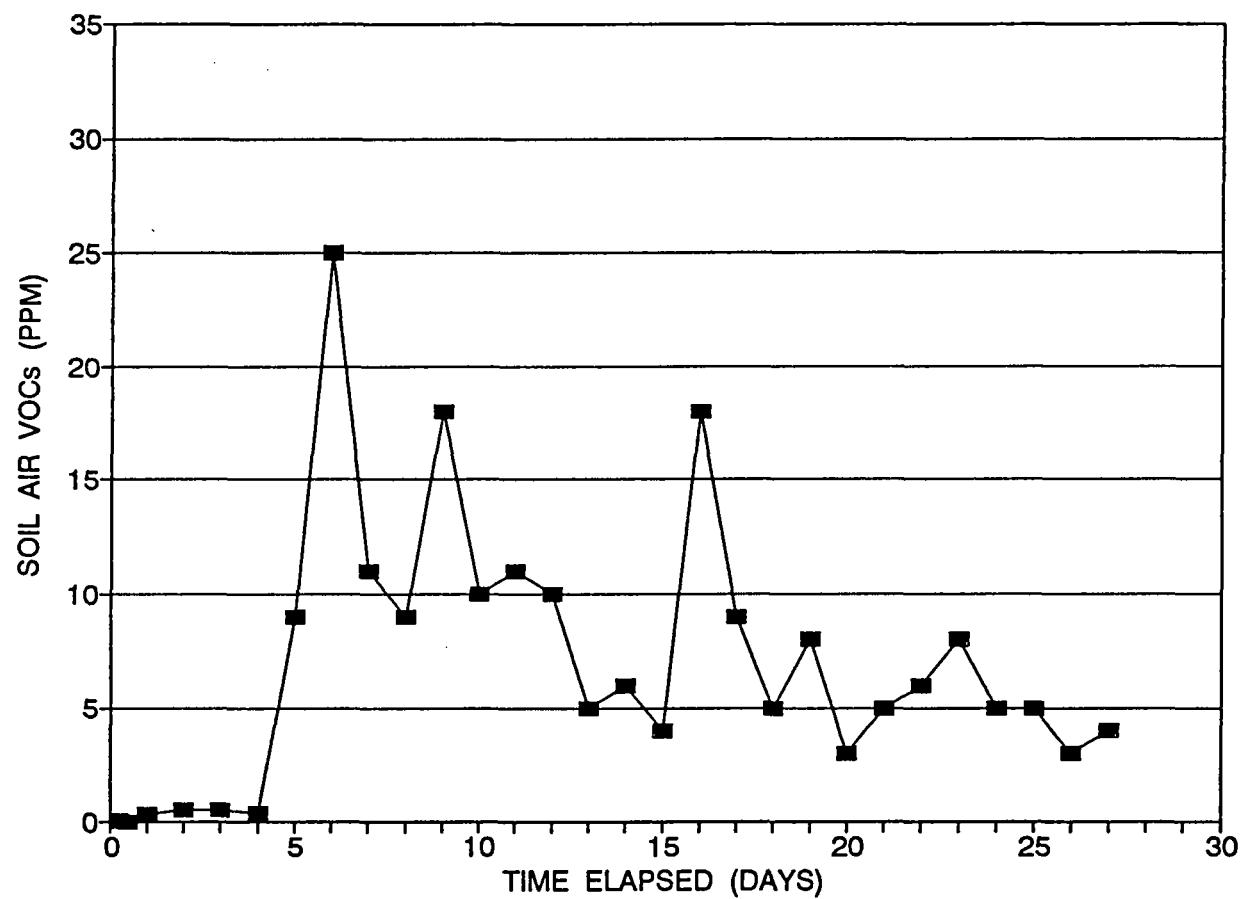


Figure 5e.

Soil Surface Air VOC Concentration; Soil Unit HV5

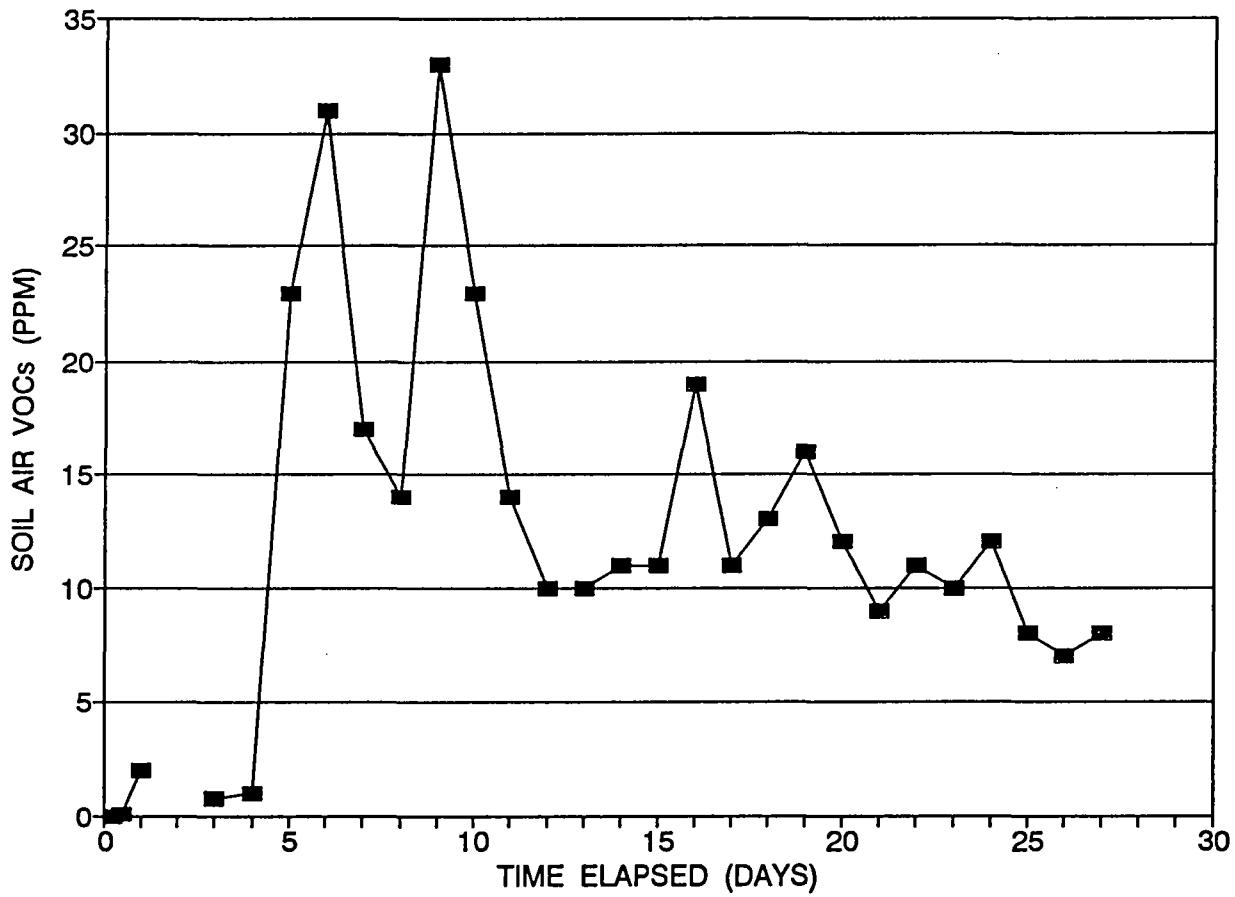


Figure 5f.

Soil Surface Air VOC Concentration; Soil Unit HV6

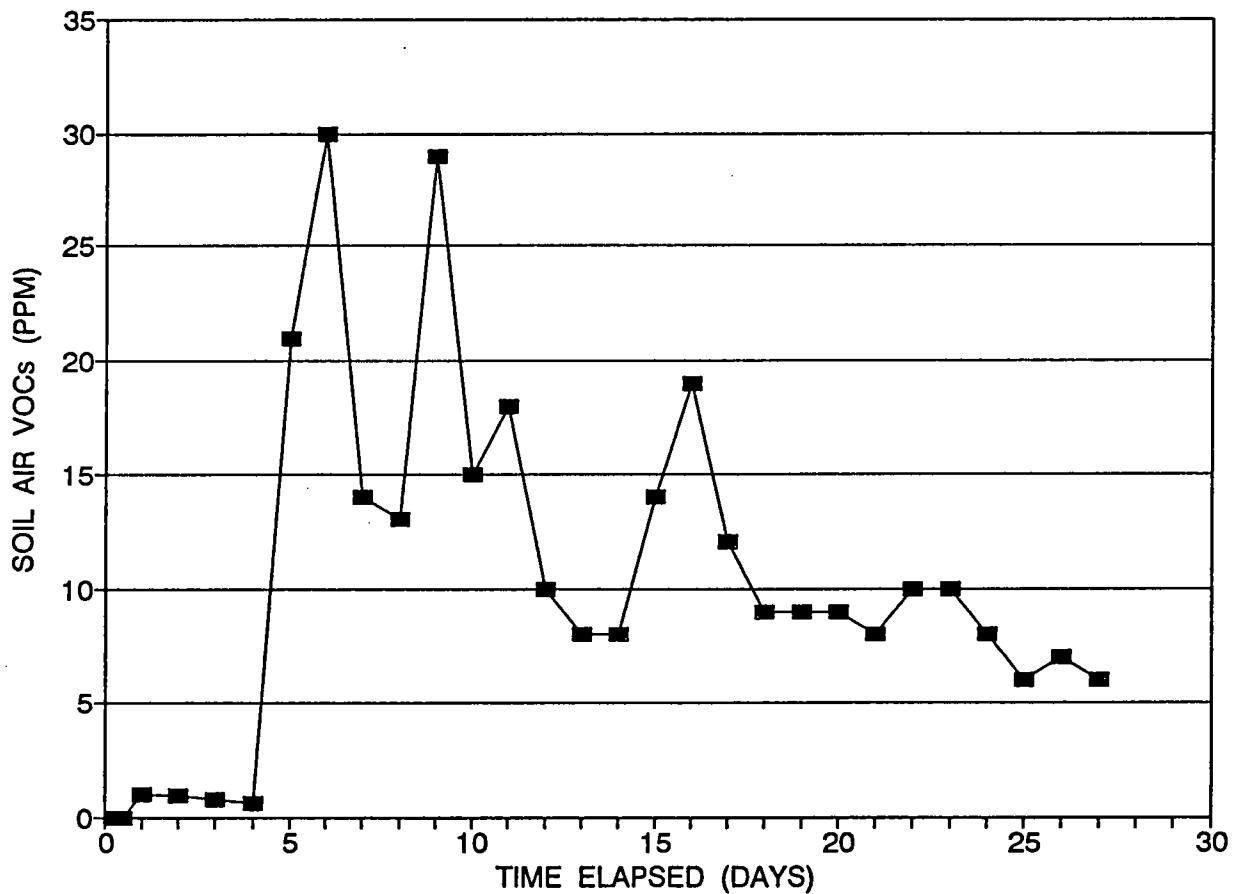


Figure 5g.

Soil Surface Air VOC Concentration; Soil Unit HV7

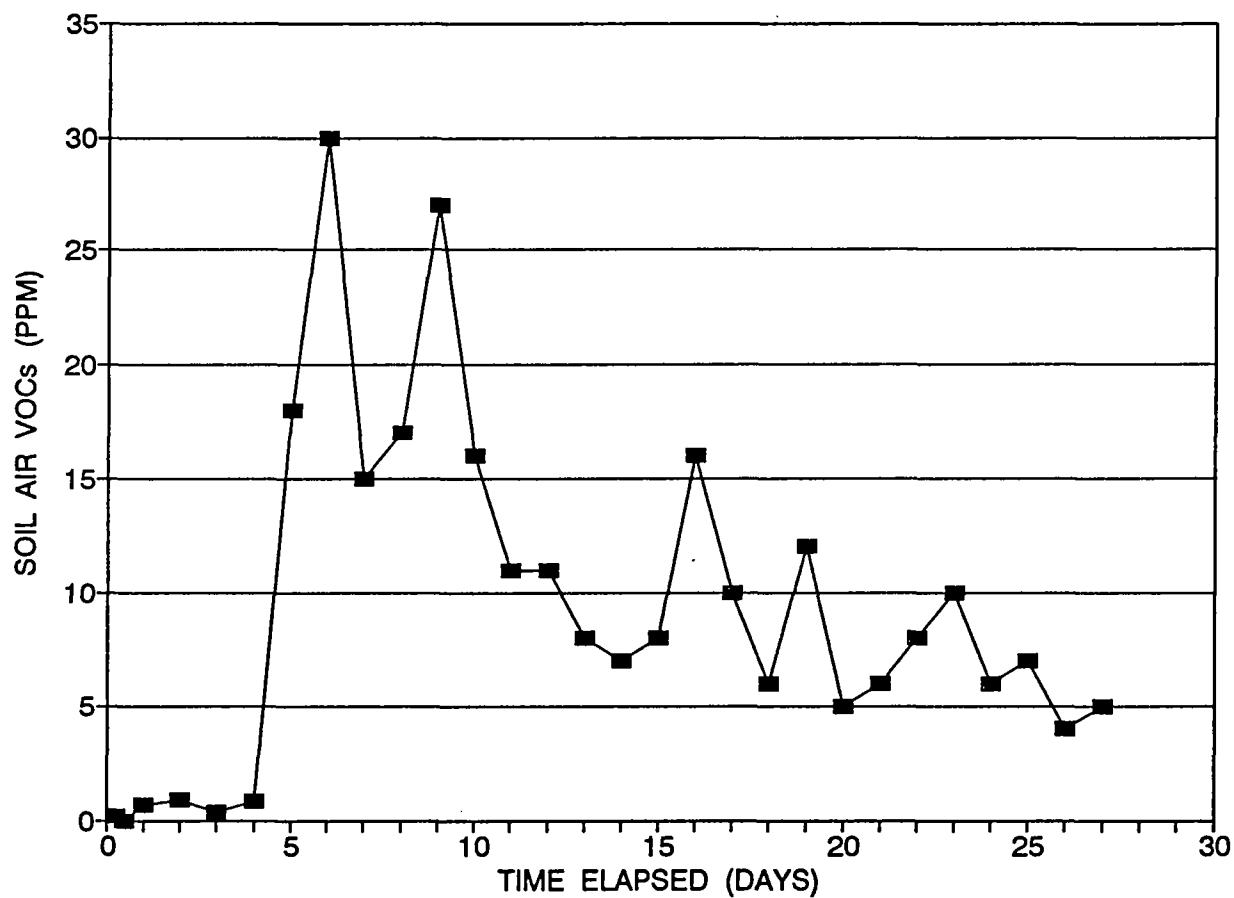


Figure 5h.

Soil Surface Air VOC Concentration; Soil Unit HV8

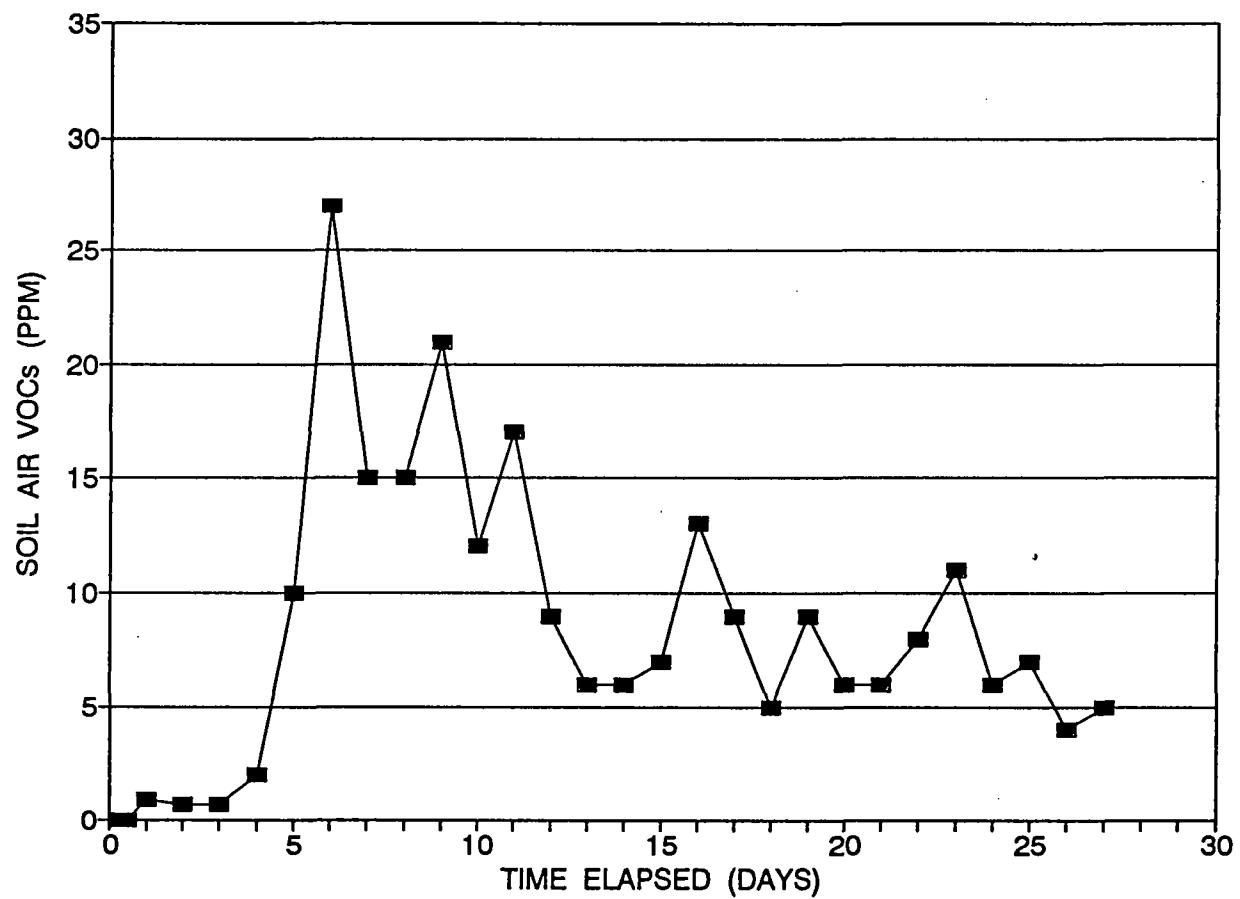


Figure 6a.

Volatilization of PCE from Soil Unit HV10 in a Closed Chamber

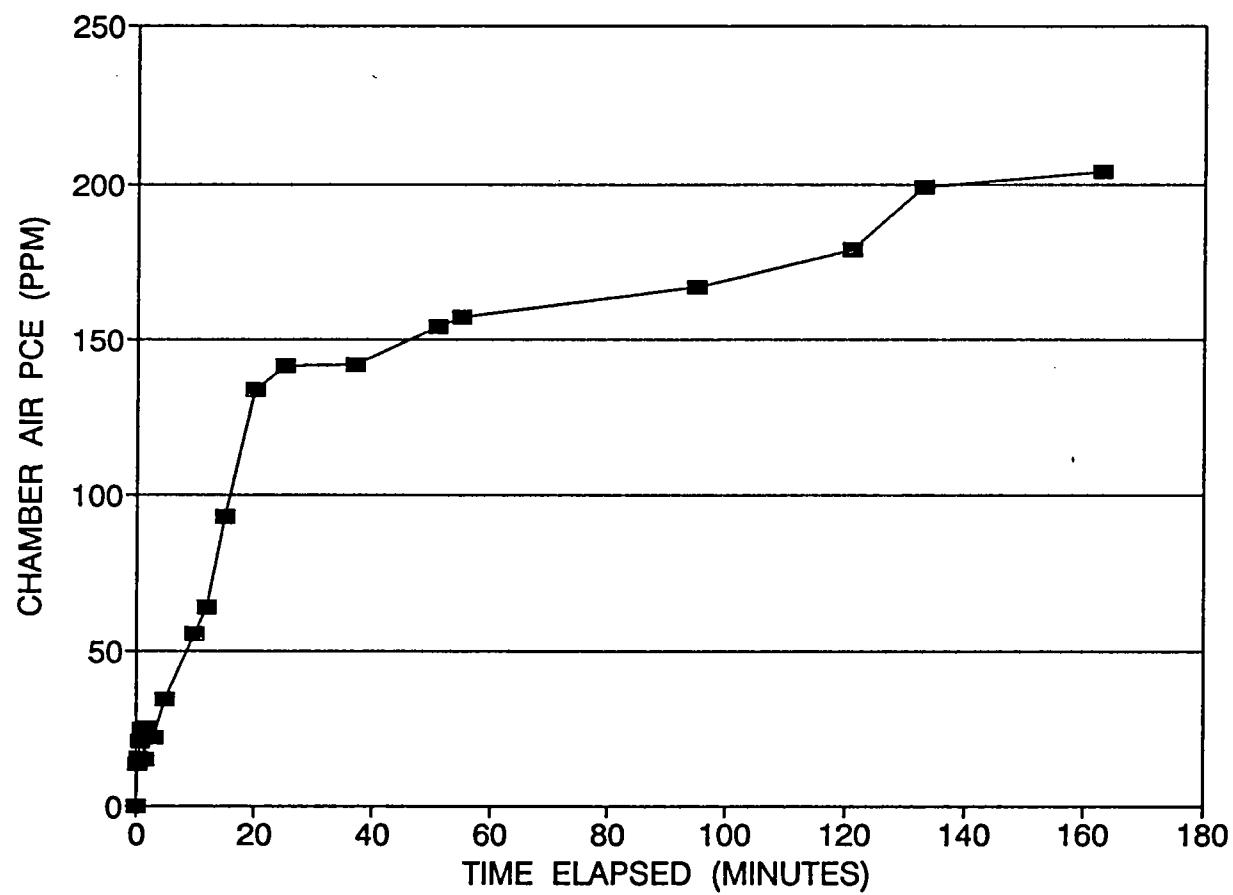


Figure 6b.

Volatilization of PCE from Soil Unit HV11 in a Closed Chamber

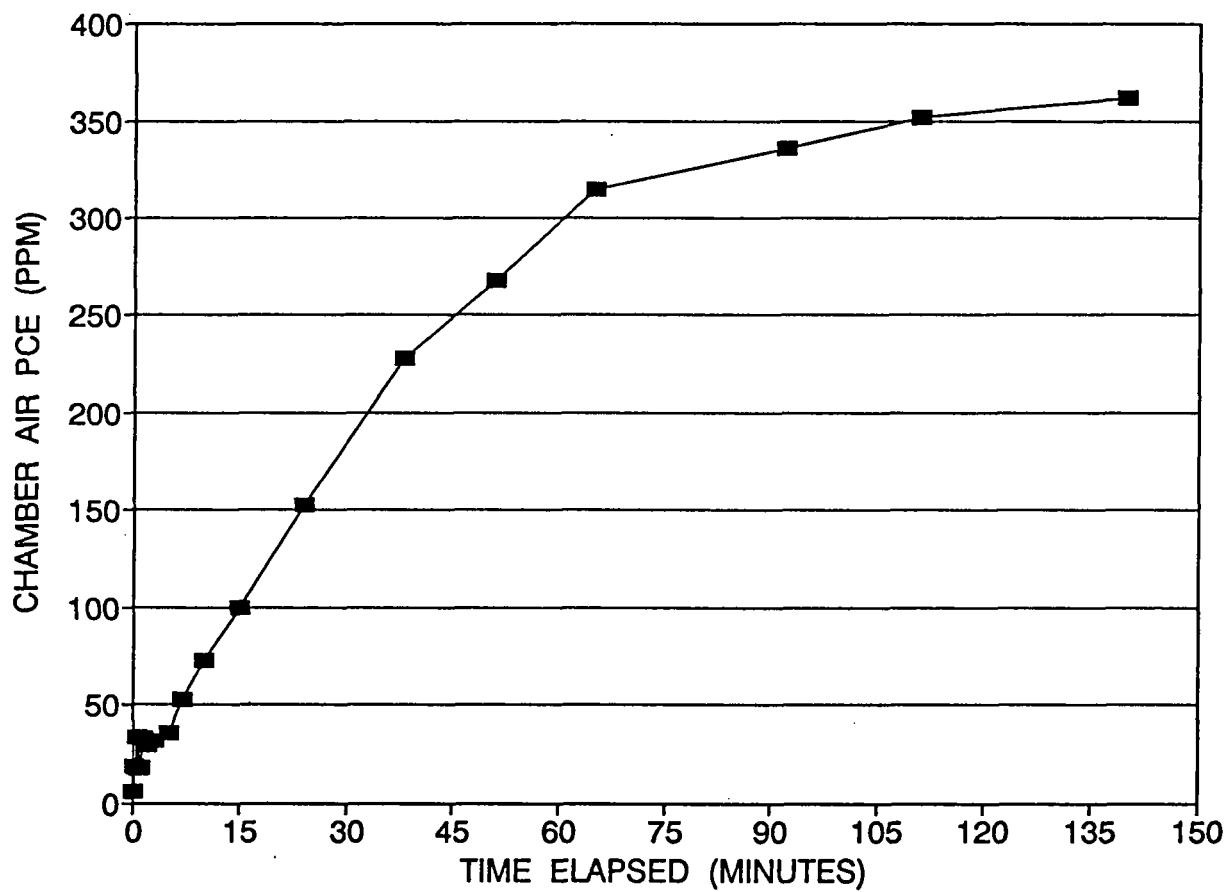


Figure 7a.

Initial Volatilization Rate of PCE Over 25 Minutes, Determined by Linear Regression Analysis; Soil Unit HV10

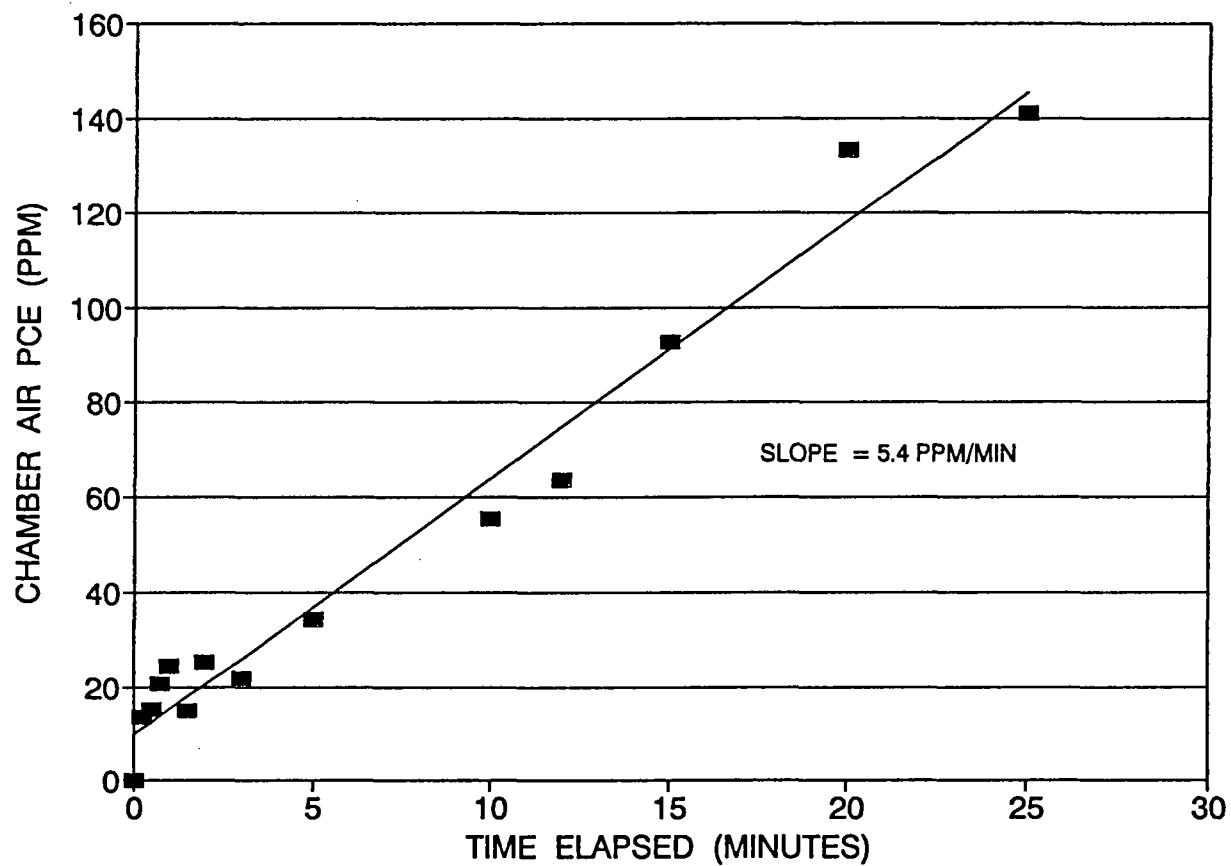


Figure 7b.

Initial Volatilization Rate of PCE Over 25 Minutes, Determined by Linear Regression Analysis; Soil Unit HV11

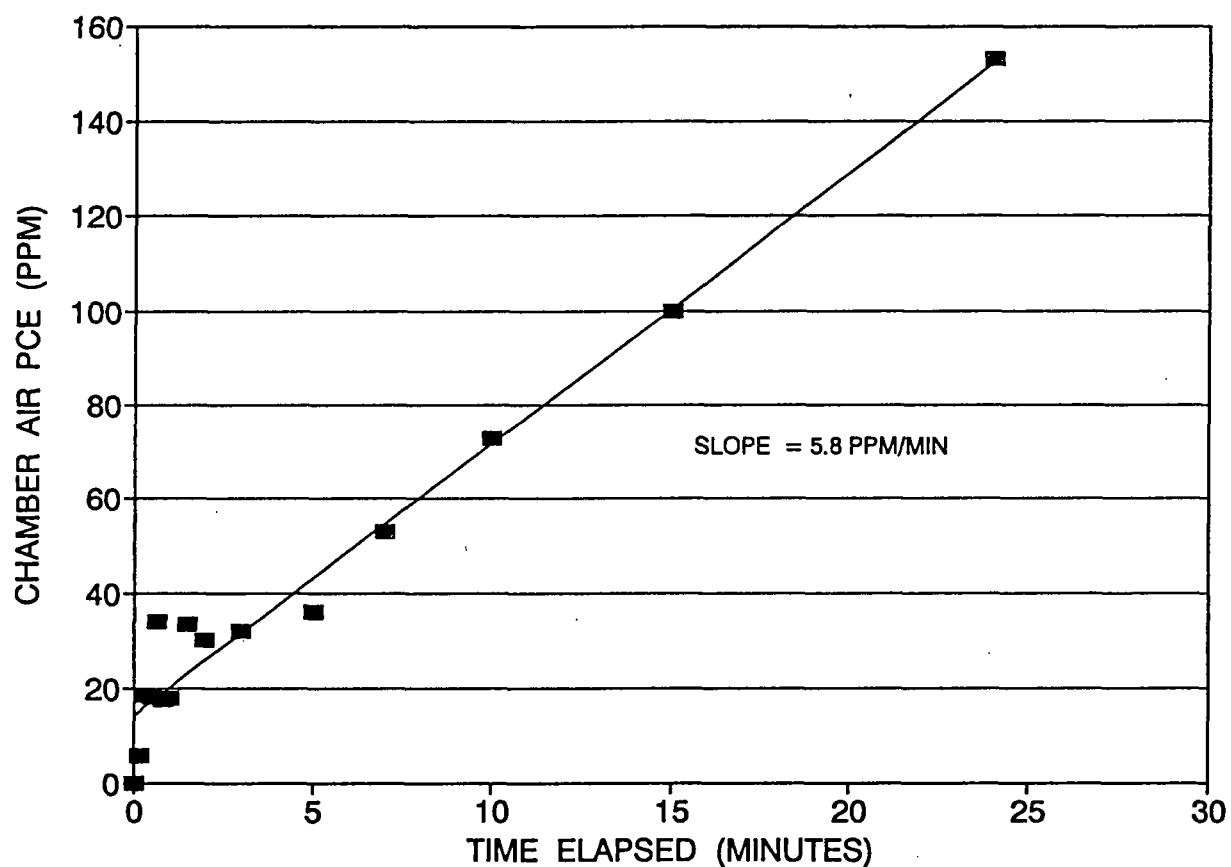


Figure 8. PCE Volatilization Equilibrium Levels in a Closed Chamber; Soil Unit HV11

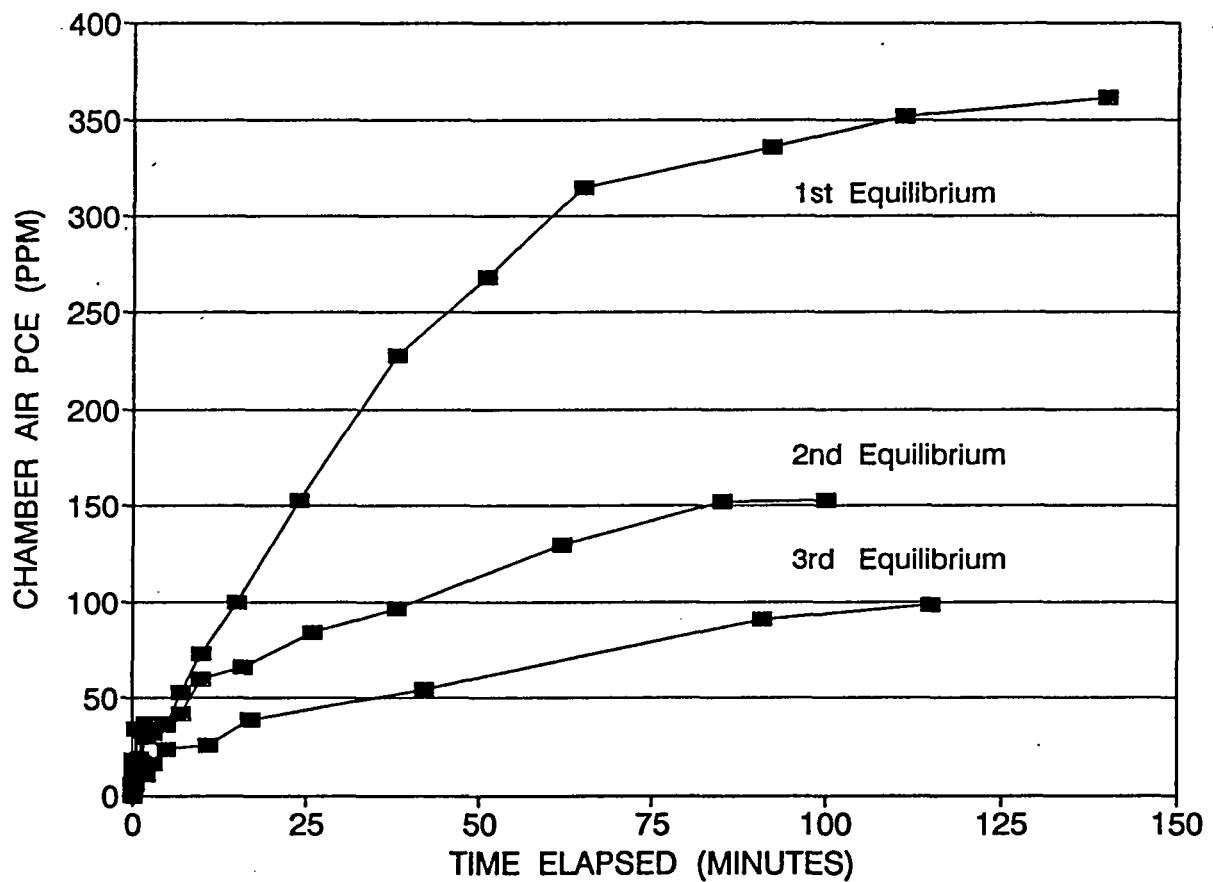


Figure 9. Calculations to Convert PPM in Air to Mass Per Volume

PARAMETERS

PCE molecular weight = 165.83 g/mole

Gas constant = 24.4 L/mole at 25°C and 760 mm Hg

Chamber size = 100 L

EQUATION<sup>1</sup>

$$\text{PPM} = (1 \text{ L}/10^6 \text{ L air}) \times (\text{mole}/24.4 \text{ L}) \times (\text{PCE molecular weight}) \times (10^3 \text{ L}/\text{m}^3)$$

A. Initial Volatilization Rate = 5.6 ppm/minute

$$\begin{aligned} 5.6 \text{ ppm} &= (5.6 \text{ L}/10^6 \text{ L air}) \times (\text{mole}/24.4 \text{ L}) \times (165.83 \text{ g}/\text{mole}) \times (10^3 \text{ L}/\text{m}^3) \\ &= 38.1 \text{ g}/10^3 \text{ m}^3 \text{ air} \\ &= 38.1 \text{ mg}/\text{m}^3 \text{ air} \end{aligned}$$

Initial Volatilization Rate = 5.6 ppm/minute = 38.1 mg/m<sup>3</sup> air/minute

B. Chamber Air PCE concentration at 2 hours = 278 ppm

$$\begin{aligned} 278 \text{ ppm} &= (278 \text{ L}/10^6 \text{ L air}) \times (\text{mole}/24.4 \text{ L}) \times (165.83 \text{ g}/\text{mole}) \\ &= 1889 \text{ g}/10^6 \text{ L air} \\ &= 1.89 \text{ mg/L air} \\ &= 189 \text{ mg}/100 \text{ L chamber} \end{aligned}$$

Chamber Air PCE concentration = 278 ppm = 189 mg/100 L chamber

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<sup>1</sup> Olishfski, JB. 1979. Fundamentals of Industrial Hygiene, Second Edition. National Safety Council, Chicago, Ill.

**APPENDIX B**  
**TABLES**

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Table 1: Initial Soil Unit Weights and Water Additions

SOIL UNIT	INITIAL SOIL WEIGHT (g)	INITIAL SOIL VOLUME (ml)	WATER ADDED (ml)
HV1	4252	3543	—
HV2	4253	3544	—
HV3	4422	3685	634
HV4	4082	3404	596
HV5	4422	3685	—
HV6	4195	3496	—
HV7	4083	3403	596
HV8	4366	3638	625

Table 2. Initial Soil Unit and Chamber Conditions

SOIL UNIT	SOIL MOISTURE CONTENT	CHAMBER RH
HV1	23 %	ambient (< 30 %)
HV2	23 %	> 75 %
HV3	34 %	ambient (< 30 %)
HV4	34 %	> 75 %
HV5	23 %	ambient (< 30 %)
HV6	23 %	> 75 %
HV7	34 %	ambient (< 30 %)
HV8	34 %	> 75 %

Table 3: Moisture Content of Soil Units

SOIL UNIT	MOISTURE CONTENT (% V/V)			
	DAY 1	DAY 13	DAY 18	DAY 28
HV1	23	19	20	18
HV2	23	20	20	19
HV3	34	30	26	25
HV4	34	28	32	29
HV5	23	22	19	19
HV6	23	22	21	19
HV7	34	29	30	26
HV8	34	30	31	28

Table 4: Chamber Air VOC Concentration Over 24 Hour Time Period

Soil Unit HV1 6/23/92		Soil Unit HV2 6/17/92		Soil Unit HV3 6/17/92		Soil Unit HV4 6/23/92	
Time (Hours)	Chamber VOCs*	Time (Hours)	Chamber VOCs	Time (Hours)	Chamber VOCs	Time (Hours)	Chamber VOCs
0	2	0	0	0.25	9	0	1
1.3	10	0.7	5	1	7	1.1	9
2.3	9	1.4	5	1.7	9	1.7	9
3.7	15	3.3	9	3.5	12	2.3	8
4.9	16	4.2	8	4.5	11	4.2	10
5.9	16	5.3	7	5.4	11	5.5	14
6.8	16	6.2	8	6.4	10	6.5	14
22.7	16	8.9	11	9.3	10	7.4	13
		22.6	6	22.8	11	23.3	12
Soil Unit HV5 6/23/92		Soil Unit HV6 6/23/92		Soil Unit HV7 6/23/92		Soil Unit HV8 6/16/92	
Time (Hours)	Chamber VOCs	Time (Hours)	Chamber VOCs	Time (Hours)	Chamber VOCs	Time (Hours)	Chamber VOCs
0	2	0	3	0	1	0	4
1	10	1.2	9	1.2	12	1.3	12
2	10	2.2	7	2	8	2.3	16
3.4	13	3.4	9	3.1	7	3.5	16
4.7	20	4.9	16	4.5	7	4.5	18
5.7	21	5.9	18	5.8	19	5.7	21
6.7	19	6.9	16	6.8	17	6.6	21
22.5	20	22.7	14	7.7	17	7.7	22
				23.6	14	8.3	22
						24.3	25

\* Chamber VOCs in ppm

Table 5. Analysis of Soil Tetrachloroethene (PCE) Content

		SOIL PCE CONCENTRATION (PPB)														
SAMPLE TIME	DAY 1, background	DAY 1, 6 hours	DAY 1, 12 hours	DAY 2	DAY 3	DAY 4	DAY 6	DAY 8	DAY 11	DAY 14	DAY 17	DAY 20	DAY 23	DAY 26	DAY 28	
SAMPLE EVENT #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
SOIL UNIT #																
HV1	ND*	560+	ND	ND	ND	ND	ND	ND	ND	ND	ND**	ND	ND	ND	ND	ND
HV2	ND	120	240	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HV3	ND	1000	300	300	250	190	ND	370	ND	ND						
HV4	ND	650	1200	130	420	160	470	ND	ND	ND	30	ND	29	65	ND	
HV5	ND	510	260	120	150	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HV6	ND	280	170	110	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HV7	ND	300	320	240	160	ND	ND	220	220	ND	ND	ND	ND	ND	ND	ND
HV8	ND	250	240	320	210	160	ND	ND	ND	300	ND	ND	ND	ND	ND	ND

ND Not Detected

\* Soil samples were analyzed with USEPA method 8010, unless otherwise noted. Detection limit is 100 ppb for sample sets 1 through 10.

+ Soil sample was analyzed with USEPA method 8260.

\*\* Detection limit is 20 ppb for sample sets 11 through 15.

Table 6: Rapid Volatilization of PCE from Spiked Soil Samples; Soil Unit HV9

	PCE IN AIR (PPM)					
Sample Number	1	2	3	4	5	6
PCE Spike	100 ppm	100 ppm	200 ppm	200 ppm	200 ppm	200 ppm
Time (seconds)*						
5	62	31	55	60	---	---
30	74	89	71	62	---	---
60	15	9	32	11	---	---
90	7	3	10	16	---	---
vial closing	5	2	3	4	285+	285+
Soil PCE** (ppb)	27	59	62	130	6900	9700

\* PCE readings were taken from 5 to 90 seconds. A final reading was taken just prior to closing the vial.

\*\* Soil PCE content was determined from spiked soil samples. The sample vial was closed approximately five minutes after the PCE spike. Soil samples were analyzed with USEPA method 8010. Detection limit is 20 ppb.

**APPENDIX C**  
**DAILY DATA REPORTS**

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 5, 1992 (Day 1, 6 Hours)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	75 (a)	86 (a)	1.8 (b)	ND (c)
HV2	75	94	ND	0.1
HV3	75	75	ND	ND
HV4	75	94	ND	<0.1
HV5	75	77	ND	ND
HV6	75	99	ND	ND
HV7	75	73	ND	0.2
HV8	75	94	0.2	ND

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector with an 11.7 mV lamp.

(c) Not detected

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Miller Date: 6/12/92

# The Dragun Corporation

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## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 5, 1992 (Day 1, 12 Hours)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	74.5 (a)	88 (a)	ND (b,c)	ND
HV2	75	96	ND	ND
HV3	74.6	91	ND	<0.1
HV4	74.7	96	ND	ND
HV5	74.5	89	ND	<0.1
HV6	75	97.3	ND	ND
HV7	74.4	92	ND	ND
HV8	74.4	93	ND	ND

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector with an 11.7 mV lamp.

(c) Not detected

\* Average of three soil air VOC determinations per soil unit.

Analyst: John L. Kilian Date: 6/12/92

# The Dragun Corporation

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## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 6, 1992 (Day 2)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	74.2 (a)	92.9 (a)	15 (b)	0.3
HV2	74.2	97.1	15.2	0.5
HV3	74.1	96	29.6	0.4
HV4	74.2	95.8	27	0.3
HV5	74.1	95	30	2
HV6	74.2	97.5	32.1	1.2
HV7	74.2	95.6	24.6	0.7
HV8	74.2	95.5	30	0.9

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with a Photovac Tip I photoionization detector with a 10.2 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Johnson Date: 6/12/92

# The Dragun Corporation

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 7, 1992 (Day 3)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	76.2 (a)	92.8 (a)	10.1 (b) 26 (c)	NDA (d)
HV2	76.2	95.4	9.7	NDA
HV3	76.1	95.1	18.1	1.1
HV4	75.9	94.9	17.5 21 (c)	0.5
HV5	75.9	94.6	14.1 36 (c)	NDA
HV6	75.9	96.3	14.9	1
HV7	75.8	94.4	15.6 22 (c)	0.9
HV8	75.5	94.3	15.2 18 (c)	0.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with a Photovac Tip I photoionization detector with a 10.2 mV lamp, unless otherwise indicated. (Instrument verification)

(c) VOCs determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

(d) No VOC data available for this soil unit.

\* Average of three soil air VOC determinations per soil unit.

Analyst: John J. Hill Date: 6/12/92

# The Dragun Corporation

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 8, 1992 (Day 4)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	73.3 (a)	99.7 (a)	4 (b)	0.3
HV2	73.3	100	6.7	0.4
HV3	73.3	100	11.8	0.4
HV4	74	99	11.9	0.5
HV5	74	99.8	8.5	0.8
HV6	74	100	8.4	0.8
HV7	73.9	98.5	9.9	0.4
HV8	73.8	99.9	11.4	0.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with a Photovac Tip I photoionization detector with a 10.2 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy L. Kline Date: 6/12/92

# The Dragun Corporation

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 9, 1992 (Day 5)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	71.1 (a)	98 (a)	6.7 (b) 27 (c)	1
HV2	71.3	98.8	9.6 18 (c)	1.3
HV3	71.3	98.2	15.2 23 (c)	0.4
HV4	71.3	98.4	12.3 20 (c)	0.4
HV5	71.5	97.9	7 30 (c)	1.3
HV6	71.6	98.5	10.5 21 (c)	0.6
HV7	71.6	97.6	13.3 20 (c)	0.8
HV8	71.6	97.6	13.6 17 (c)	1.8

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with a Photovac Tip I photoionization detector with a 10.2 mV lamp, unless otherwise indicated. (Instrument verification)

(c) VOCs determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy L. Hall Date: 6/12/92

# The Dragun Corporation

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 10, 1992 (Day 6)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	73.2 (a)	93.9 (a)	27 (b)	18.6
HV2	73.2	95	16	16.3
HV3	73.1	95.1	23	14.6
HV4	73	95.3	17	9.3
HV5	73	94.5	26	22.6
HV6	72.9	95.6	21	21
HV7	72.9	94.6	21	17.6
HV8	72.9	94.8	17	10.3

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Kline Date: 6/12/92

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 11, 1992 (Day 7)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	72.9 (a)	95.7 (a)	25 (b)	19.3
HV2	72.9	96.7	15	17.3
HV3	72.9	96.5	18	26.6
HV4	73	96.4	16	25.3
HV5	72.9	95.6	22	31.3
HV6	72.9	96.1	18	30
HV7	73	95.3	17	30
HV8	73	95.2	17	26.6

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Kuhne Date: 6/16/92

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 12, 1992 (Day 8)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	72.4 (a)	96 (a)	18 (b)	8
HV2	72.5	96.9	8	7.3
HV3	72.5	96.6	15	8
HV4	72.7	96.8	10	10.6
HV5	72.7	96.6	17	16.7
HV6	72.7	96.3	14	14
HV7	72.7	95.7	13	14.7
HV8	72.8	95.8	10	14.5 (c)

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

(c) Average of two soil air VOC determinations for this soil unit.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Kitter Date: 6/16/92

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 13, 1992 (Day 9)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	70 (a)	98 (a)	13 (b)	7
HV2	70.3	97.8	13	5.3
HV3	70.6	97.8	20	12.7
HV4	70.7	98.5	13	9
HV5	70.7	97.9	22	13.7
HV6	70.8	99	15	13
HV7	70.8	98.1	14	17
HV8	70.6	96.7	13	14.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Kuhn Date: 6/16/92

# The Dragun Corporation

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## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 14, 1992 (Day 10)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	77.3 (a)	92.1 (a)	18 (b)	17.3
HV2	77.2	95.1	20	12.3
HV3	77	93.7	28	32.6
HV4	76.8	95	19	18.3
HV5	76.7	93.2	27	32.6
HV6	76.6	94.4	21	28.6
HV7	76.4	93	20	26.6
HV8	76.3	93.9	18	21

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy K. Miller Date: 6/18/92

# The Dragun Corporation

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 15, 1992 (Day 11)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	69.6 (a)	94.8 (a)	18 (b)	14.6
HV2	69.6	96.7	17	9.3
HV3	69.6	96.9	25	13.3
HV4	69.7	98.2	18	10
HV5	69.6	97.8	24	22.7
HV6	69.6	97.1	19	14.7
HV7	69.7	96	18	16
HV8	69.6	96.5	22	12

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: John Miller Date: 6/18/92

# The Dragun Corporation

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## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 16, 1992 (Day 12)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	70.9 (a)	96.2 (a)	25 (b)	14.6
HV2	71	97	15	13.6
HV3	71	96.8	18	11
HV4	71.1	96.2	12	11.3
HV5	71	95.8	19	14.3
HV6	71.1	96.5	15	17.6
HV7	71.1	95.3	13	10.7
HV8	70	97	27	17

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wenbin Liu Date: 6/18/92

# The Dragun Corporation

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## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 17, 1992 (Day 13)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	72.5 (a)	95.7 (a)	15 (b)	8
HV2	72.4	96.5	8	6
HV3	72.4	96.8	14	8.7
HV4	72.2	96.4	12	9.7
HV5	72	95.8	27	10.3
HV6	72	96.1	21	9.7
HV7	71.8	95.5	24	10.3
HV8	71.8	95.5	25	8.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Kilin Date: 6/24/92

# The Dragun Corporation

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 18, 1992 (Day 14)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	73.2 (a)	96.8 (a)	15 (b)	6.3
HV2	73.5	97.5	6	3.7
HV3	73.6	97.2	11	7.7
HV4	73.8	96.9	6	5
HV5	73.5	95.9	13	10
HV6	73.5	96.4	8	8
HV7	73.5	95.6	8	8.3
HV8	73.4	95.7	6	6.3

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: John D. Kilmer Date: 6/24/92

# The Dragun Corporation

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 19, 1992 (Day 15)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	71 (a)	95.5 (a)	16 (b)	6.3
HV2	71.3	96	6	4
HV3	71.5	95.5	8	7.3
HV4	71.7	95.2	6	5.7
HV5	71.6	95.5	11	10.7
HV6	71.7	95.3	8	8.3
HV7	71.6	95.1	8	6.7
HV8	71.6	94.8	7	5.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Liles Date: 6/24/92

# The Dragun Corporation

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 20, 1992 (Day 16)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	71.9 (a)	93.9 (b)	12 (b)	9.3
HV2	72	95.8	10	4.3
HV3	72.1	94.3	7	3
HV4	72.3	94.8	5	4
HV5	72.3	94.4	12	11.3
HV6	72.3	94.7	8	14.3
HV7	72.7	94.8	8	8
HV8	72.3	94.5	7	6.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Johnson Date: 6/26/92

# The Dragun Corporation

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## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 21, 1992 (Day 17)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	74.6 (a)	90.9 (a)	22 (b)	11.3
HV2	74.6	91.8	11	13
HV3	74.6	91.6	14	14.6
HV4	74.5	92.9	10	17.7
HV5	74.5	91.3	16	18.7
HV6	74.5	92.5	15	19.3
HV7	74.6	91.4	13	16
HV8	74.7	92.7	12	12.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Kehler Date: 6/26/92

# The Dragun Corporation

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## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 22, 1992 (Day 18)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	72.4 (a)	95.7 (a)	22 (b)	12
HV2	72.9	97	12	9.7
HV3	73	96.2	17	9
HV4	73	95.8	12	9
HV5	73.1	95.4	21	10.7
HV6	73.2	95.8	15	12.3
HV7	73.1	95.7	13	10.3
HV8	73.1	95.3	11	9

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: John Miller Date: 6/26/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 23, 1992 (Day 19)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	71.6 (a)	94.8 (a)	19 (b)	8
HV2	71.7	95.3	11	5
HV3	71.9	96.6	14	7.3
HV4	72.1	94.8	9	5.3
HV5	72.1	93.3	15	13
HV6	72.2	94.7	11	9.3
HV7	72	96	11	6.3
HV8	72.1	94.8	8	5.3

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Mark Kilian Date: 6/30/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 24, 1992 (Day 20)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	71.5 (a)	94.8 (a)	16 (b)	7.7
HV2	71.9	95	10	6.3
HV3	72	94.3	13	8.3
HV4	72.1	94.9	12.2	8
HV5	72.1	94.1	20	16
HV6	72.1	94.3	14	9
HV7	72.1	94.2	14	12
HV8	72	93.5	13	8.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: W. L. Miller Date: 6/30/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 25, 1992 (Day 21)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	71.3 (a)	93 (a)	15 (b)	4
HV2	71.4	94.7	7	6
HV3	71.4	94.8	10	6
HV4	71.3	94.9	9	3
HV5	71.3	94.3	15	12.3
HV6	71.3	94.8	10	9
HV7	71.2	94.4	9	4.7
HV8	71.3	92.9	6	7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Klein Date: 6/30/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 26, 1992 (Day 22)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	72.8	91.3	17	5
HV2	72.7	93.1	13	2
HV3	72.5	96.1	11	6
HV4	72.7	94.8	9	4.7
HV5	72.7	93.2	13	8.7
HV6	72.7	94.9	10	8
HV7	72.7	92.8	9	5.7
HV8	72.5	92.9	7	6.3

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: John A. Miller Date: 6/30/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE

EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: June 27, 1992 (Day 23)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	72.2 (a)	92.8 (a)	16 (b)	4
HV2	72.7	93.1	8	4.3
HV3	72.2	93.9	9	7
HV4	72.2	94.3	8	5.7
HV5	72.2	93.5	13	11
HV6	72.2	93	9	10
HV7	72.2	93.5	8	8.3
HV8	72.2	93.2	9	8.3

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Miller Date: 7/2/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 28, 1992 (Day 24)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	74.6 (a)	91.3 (a)	17 (b)	5
HV2	74.8	93.3	12	3.3
HV3	74.8	93	13	6.3
HV4	74.8	93	11	8.3
HV5	74.8	91.8	16	9.7
HV6	75	92.6	13	9.7
HV7	74.7	91.2	12	10
HV8	74.6	92.2	10	10.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Klein Date: 7/2/92

# The Dragun Corporation

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## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 29, 1992 (Day 25)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	73.4 (a)	96.9 (a)	13 (b)	5.7
HV2	74.1	98.8	9	6
HV3	74.2	97.3	9	6
HV4	74.2	97	10	5
HV5	74.2	96.1	13	11.7
HV6	74.3	95.5	10	8.3
HV7	74.3	95.9	8	6.3
HV8	74.2	95.2	8	6

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Miller Date: 7/2/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 30, 1992 (Day 26)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	72.8 (a)	94.1 (a)	11 (b)	3.3
HV2	73	94.9	7	3.3
HV3	73.1	94.8	7	3.3
HV4	73.3	94.6	6	5.3
HV5	73.4	92.8	8	7.7
HV6	73.5	93.1	6	6.3
HV7	73.5	93.1	9	6.7
HV8	73.5	93.2	6	7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Hahn Date: 7/6/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## ---- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ----

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JULY 1, 1992 (Day 27)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	72.1 (a)	94 (a)	9 (b)	3.3
HV2	72.3	94.6	6	3.7
HV3	72.4	94.5	5	2.7
HV4	72.5	94.2	5	3.3
HV5	72.7	92.7	7	6.7
HV6	72.7	93.6	6	6.7
HV7	72.4	95.9	5	3.7
HV8	72.4	93.9	4	4

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy Miller Date: 7/6/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## --- ENVIRONMENTAL FATE AND TREATABILITY LABORATORY ---

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JULY 2, 1992 (Day 28)

SOIL UNIT	CHAMBER TEMPERATURE (F)	CHAMBER RH (%)	CHAMBER AIR VOCs (ppm)	AVG. SOIL AIR VOCs (ppm)*
HV1	72.9 (a)	93.1 (a)	9 (b)	4
HV2	73	94	6	4
HV3	73.1	95	6	4.3
HV4	73.1	93.7	6	4
HV5	73	94.8	9	8
HV6	73.1	94.7	9	6.3
HV7	73	93.8	7	5.3
HV8	73	94	6	4.7

(a) Temperature and Relative Humidity (RH) determined with a Tri-Sense (Cole Parmer) instrument used according to manufacturer's instructions.

(b) Volatile Organic Compounds (VOCs) determined with an HNu (model HW-101) photoionization detector, with an 11.7 mV lamp.

\* Average of three soil air VOC determinations per soil unit.

Analyst: Wendy J. Miller Date: 7/4/92

**APPENDIX D**  
**VOLATILIZATION RATE STUDY DATA REPORTS**

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## —ENVIRONMENTAL FATE AND TREATABILITY LABORATORY—

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 25, 1992

### INITIAL PCE VOLATILIZATION RATE

#### SOIL UNIT HV10

Soil Weight: 3.4 kg  
Chamber RH: 65%  
Chamber Temp.: 72.7 F

TIME (MINUTES)	CHAMBER VOCs (PPM)*	CALCULATED Y VALUES (Y = mX + b)	Regression Output:	
			Constant	9.63
0.00	0.00	9.63	Std Err of Y Est	7.88
0.25	13.50	10.99	R Squared	0.97
0.50	15.20	12.35	No. of Observations	14.00
0.75	20.70	13.70	Degrees of Freedom	12.00
1.00	24.40	15.06	X Coefficient(s)	5.44
1.50	14.70	17.78	Std Err of Coef.	0.27
2.00	25.20	20.50		
3.00	21.90	25.93		
5.00	34.20	36.81		
10.00	55.50	63.98		
12.00	63.70	74.85		
15.00	92.80	91.16		
20.00	133.50	118.34		
25.00	141.30	145.52		
37.00	141.80			
51.00	154.00			
55.00	157.00			
95.00	167.00			
121.00	179.00			
133.00	199.00			
163.00	204.00			

\* Volatile Organic Compounds (VOCs) determined with a Photovac Tip I photoionization detector with a 10.2 mV lamp.

Analyst: John M. Miller Date: 7/2/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

—ENVIRONMENTAL FATE AND TREATABILITY LABORATORY—

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 29, 1992

INITIAL PCE VOLATILIZATION RATE

SOIL UNIT HV11

Soil Weight: 3.2 kg  
Chamber RH: 60%  
Chamber Temp.: 72.8 F

TIME (MINUTES)	CHAMBER VOCs (PPM)*	CALCULATED Y VALUES (Y = mX + b)	Regression Output:	
			Constant	14.21
FIRST RUN			Std Err of Y Est	7.56
0.00	0.00	14.21	R Squared	0.97
0.17	5.80	15.19	No. of Observations	15.00
0.33	18.60	16.11	Degrees of Freedom	13.00
0.50	18.10	17.09	X Coefficient(s)	5.76
0.66	34.00	18.02	Std Err of Coef.	0.29
0.83	17.50	19.00		
1.00	17.90	19.98		
1.50	33.40	22.86		
2.00	30.00	25.74		
3.00	32.00	31.50		
5.00	36.00	43.03		
7.00	53.00	54.55		
10.00	73.00	71.84		
15.00	100.00	100.66		
24.00	153.00	152.52		
38.00	228.00			
51.00	268.00			
65.00	315.00			
92.00	336.00			
111.00	352.00			
140.00	362.00			

\* Volatile Organic Compounds (VOCs) determined with a Photovac Tip I photoionization detector with a 10.2 mV lamp.

Analyst: Wendy Klein Date: 7/2/92

# The Dragun Corporation

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—ENVIRONMENTAL FATE AND TREATABILITY LABORATORY—

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 29, 1992

INITIAL PCE VOLATILIZATION RATE

SOIL UNIT HV11

Soil Weight: 3.2 kg  
Chamber RH: 60%  
Chamber Temp.: 72.8 F

TIME (MINUTES)	CHAMBER VOCs (PPM)*	CALCULATED Y VALUES (Y = mX + b)	Regression Output:	
			Constant	5.61
SECOND RUN			Std Err of Y Est	5.95
0.00	0.00	5.61	R Squared	0.80
0.25	12.00	8.39	No. of Observations	8.00
0.50	8.00	11.17	Degrees of Freedom	6.00
0.75	18.00	13.95	X Coefficient(s)	11.13
1.00	19.00	16.73	Std Err of Coef.	2.25
1.50	17.00	22.30		
2.00	37.00	27.86		
3.00	34.00	38.98		
5.00	37.00			
7.00	42.00			
10.00	60.00			
16.00	66.00			
26.00	84.00			
38.00	96.00			
62.00	129.00			
85.00	152.00			
100.00	153.00			

\* Volatile Organic Compounds (VOCs) determined with a Photovac Tip I photoionization detector with a 10.2 mV lamp.

Analyst: Wendy Miller Date: 7/2/92

# The Dragun Corporation

30445 Northwestern Hwy. • Suite 260 • Farmington Hills, MI 48334 • 313-932-0228 • FAX 313-932-0618

## —ENVIRONMENTAL FATE AND TREATABILITY LABORATORY—

PROJECT: HOWE VALLEY SITE  
EFFECT OF ROTO-TILLING ON VOC VOLATILIZATION FROM HOWE VALLEY SOILS

DATE: JUNE 29, 1992

### INITIAL PCE VOLATILIZATION RATE

#### SOIL UNIT HV11

Soil Weight: 3.2 kg  
Chamber RH: 60%  
Chamber Temp.: 72.8 F

TIME (MINUTES)	CHAMBER VOCs (ppm)*	CALCULATED Y VALUES (Y = mX + b)	Regression Output:	
			Constant	5.13
THIRD RUN			Std Err of Y Est	3.43
0.00	0.00	5.13	R Squared	0.79
0.25	4.80	6.11	No. of Observations	9.00
0.50	6.00	7.08	Degrees of Freedom	7.00
0.75	14.00	8.06		
1.00	12.00	9.03	X Coefficient(s)	3.90
1.50	13.00	10.98	Std Err of Coef.	0.76
2.00	11.00	12.93		
3.00	16.00	16.84		
5.00	24.00	24.64		
11.00	26.00			
17.00	39.00			
42.00	54.00			
91.00	91.00			
115.00	98.00			

\* Volatile Organic Compounds (VOCs) determined with a Photovac Tip I photoionization detector with a 10.2 mV lamp.

Analyst: Wendy Hulse Date: 7/3/92

**APPENDIX E**  
**ANALYTICAL DATA**

For analytical data sheets, contact:

**Corporate Environmental Controls**

**Dow Corning Corporation**

**3901 S. Saginaw**

**Midland, Michigan 48686-0995**



NATIONAL  
ENVIRONMENTAL  
TESTING, INC.

NET Midwest, Inc.  
Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326

Tel: (313) 391-2050  
Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108015

Project #1050  
Howe Valley

Sample Description: #1 HV1-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108015

Project #1050  
Howe Valley

Sample Description: #1 HV1-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/11/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108015

Project #1050  
Howe Valley

Sample Description: #1 HV1-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108016

Project #1050  
Howe Valley

Sample Description: #2 HV2-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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06/19/1992

Job No.: 92.3153  
Sample No.: 108016

Project #1050  
Howe Valley

Sample Description: #2 HV2-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/11/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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30445 Northwestern Highway  
Suite 260  
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06/19/1992

Job No.: 92.3153  
Sample No.: 108016

Project #1050  
Howe Valley

Sample Description: #2 HV2-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3153  
Sample No.: 108017

Project #1050  
Howe Valley

Sample Description: #3 HV3-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3153  
Sample No.: 108017

Project #1050  
Howe Valley

Sample Description: #3 HV3-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/11/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3153  
Sample No.: 108017

Project #1050  
Howe Valley

Sample Description: #3 HV3-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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06/19/1992

Job No.: 92.3153  
Sample No.: 108018

Project #1050  
Howe Valley

Sample Description: #4 HV4-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3153  
Sample No.: 108018

Project #1050  
Howe Valley

Sample Description: #4 HV4-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS					
Bromodichloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/11/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/19/1992

Job No.: 92.3153  
Sample No.: 108018

Project #1050  
Howe Valley

Sample Description: #4 HV4-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3153  
Sample No.: 108019

Project #1050  
Howe Valley

Sample Description: #5 HV5-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992  
Job No.: 92.3153  
Sample No.: 108019

Project #1050  
Howe Valley

Sample Description: #5 HV5-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS					
Bromodichloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/11/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/19/1992

Job No.: 92.3153  
Sample No.: 108019

Project #1050  
Howe Valley

Sample Description: #5 HV5-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)

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Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/19/1992

Job No.: 92.3153  
Sample No.: 108020

Project #1050  
Howe Valley

Sample Description: #6 HV6-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3153  
Sample No.: 108020

Project #1050  
Howe Valley

Sample Description: #6 HV6-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/11/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108020

Project #1050  
Howe Valley

Sample Description: #6 HV6-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108021

Project #1050  
Howe Valley

Sample Description: #7 HV7-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	72.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108021

Project #1050  
Howe Valley

Sample Description: #7 HV7-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/11/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108021

Project #1050  
Howe Valley

Sample Description: #7 HV7-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108022

Project #1050  
Howe Valley

Sample Description: #8 HV8-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108022

Project #1050  
Howe Valley

Sample Description: #8 HV8-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/11/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3153  
Sample No.: 108022

Project #1050  
Howe Valley

Sample Description: #8 HV8-1 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/11/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/11/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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#### METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

#### UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92-3153 10801-10805  
174

Wendy Kuhn 93-2-0228

THE DRAGUN CORPORATION	30445 Northwestern Hwy. Ste 260	Farmington Hills, MI 48334	CHAIN OF CUSTODY RECORD
------------------------	------------------------------------	-------------------------------	-------------------------

PROJECT NO 1050		SITE NAME Haw Valley		NO OF CONTAINERS	8/10		8/11				REMARKS
STATION NO	DATE	TIME	COMP		GRAB	Mixed	Marked	60	62	63	
1	6/5/92	10:20			HV1-1	1					
2		10:25	a		HV2-1	1					
3		10:30	a		HV3-1	1					
4		10:40	a		HV4-1	1					
5		10:30	a		HV5-1	1					
6		10:45	a		HV6-1	1					
7		10:50	a		HV7-1	1					
8		10:50	a		HV8-1	1					
9	6/5/92	4:30	P		HV1-2	1	X*				Set 1 has been spiked w/ 20 ppm tetrachloroethylene (TCE) ↓
10		4:35	P		HV2-2	1					* looking to verify PCE was added; also any other VOC's found
11		5:15	P		HV3-2	1					
12		5:25	P		HV4-2	1					
13		4:50	P		HV5-2	1					
RELINQUISHED BY (SIGNATURE): Wendy Kuhn		DATE/TIME 6-9-92 11:00	RECEIVED BY (SIGNATURE): Jerry A. Good		RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)				
RELINQUISHED BY (SIGNATURE):		DATE/TIME	RECEIVED BY (SIGNATURE):		RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)				
RELINQUISHED BY (SIGNATURE):		DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE): Lorraine Paulsen		DATE/TIME	REMARKS: 6/9/92 12:30 pm					



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08/11/1992

RECEIVED AUG 14 1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3153

PROJECT DESCRIPTION: Project #1050

JOB DESCRIPTION: Howe Valley

NET SAMPLE

108015  
108016  
108017  
108018  
108019  
108020  
108021  
108022

SAMPLE DESCRIPTION

#1	HV1-1	06/05
#2	HV2-1	06/05
#3	HV3-1	06/05
#4	HV4-1	06/05
#5	HV5-1	06/05
#6	HV6-1	06/05
#7	HV7-1	06/05
#8	HV8-1	06/05

Bruce E. Brown  
Project Manager

Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

08/11/1992

Job Number: 92.3153

Job Description: Howe Valley

Parameter	Units	Procedure		
		Blank	Observed	Date Analyzed
Methylene Chloride	ug/Kg	<10		06/11/1992
1,1-Dichloroethylene	ug/Kg	<10		06/11/1992
Chloroform	ug/Kg	<10		06/11/1992
1,1,1 Trichloroethane	ug/Kg	<10		06/11/1992
Trichloroethylene	ug/Kg	<10		06/11/1992
Tetrachloroethylene	ug/Kg	<10		06/11/1992

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

08/11/1992

Job Number: 92.3153

Job Description: Howe Valley

Parameter	Continuing Calibration Verification Standard		
	% Recovery	Date Analyzed	Lab Tech
Methylene Chloride	80	06/11/1992	njd
1,1-Dichloroethylene	100	06/11/1992	njd
Chloroform	90	06/11/1992	njd
1,1,1 Trichloroethane	105	06/11/1992	njd
Trichloroethylene	100	06/11/1992	njd
Tetrachloroethylene	90	06/11/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION

08/11/1992

Job Number: 92.3153

Job Description: Howe Valley

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108015	Chlorobutane	83
108016	Chlorobutane	97
108017	Chlorobutane	101
108018	Chlorobutane	98
108019	Chlorobutane	94
108020	Chlorobutane	106
108021	Chlorobutane	101
108022	Chlorobutane	88

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	76-114%	70-121%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	88-110%	81-117%	n-Propylbenzene	80-120%
Nitrobenzene-d5	86-115%	74-121%	<u>PNAH Compounds:</u>	
2-Fluorobiphenyl	35-114%	23-120%	2-Fluorobiphenyl	40-140%
Terphenyl-d14	43-116%	30-115%	<u>PCBs:</u>	
Phenol-d6	33-141%	18-137%	Decachlorobiphenyl	24-150%
2-Fluorophenol	10-94%	24-113%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2,4,6-Tribromophenol	21-100%	25-121%		
	10-123%	19-122%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/25/1992

Job No.: 92.3155  
Sample No.: 108027

Project #1050  
Howe Valley

Sample Description: #9 HV1-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	77.	%	06/22/1992	cms	160.3 (3)
VOLATILE COMPOUNDS					
Acrolein	<2000.	ug/Kg	06/17/1992	pmc	8260 (1)
Acrylonitrile	<2000.	ug/Kg	06/17/1992	pmc	8260 (1)
Benzene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Bromodichloromethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Bromoform	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Bromomethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Carbon tetrachloride	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Chlorobenzene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Chloroethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
2-Chloroethyl vinyl ether	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Chloroform	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Chloromethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Dibromochloromethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,2-Dichlorobenzene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,3-Dichlorobenzene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,4-Dichlorobenzene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,1-Dichloroethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,2-Dichloroethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,1-Dichloroethene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
trans-1,2-Dichloroethene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
cis-1,2-Dichloroethene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,2-Dichloropropane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
cis-1,3-Dichloropropene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
trans-1,3-Dichloropropene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/25/1992

Job No.: 92.3155  
Sample No.: 108027

Project #1050  
Howe Valley

Sample Description: #9 HV1-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Ethylbenzene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Methylene chloride	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,1,2,2-Tetrachloroethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Tetrachloroethene	560.	ug/Kg	06/17/1992	pmc	8260 (1)
Toluene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,1,1-Trichloroethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
1,1,2-Trichloroethane	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Trichloroethene	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Vinyl chloride	<200.	ug/Kg	06/17/1992	pmc	8260 (1)
Xylenes	<200.	ug/Kg	06/17/1992	pmc	8260 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

  
Bruce E. Brown  
Project Manager





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000





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## MICHIGAN ACT 307 REPORTING LIMIT UPDATE

In a continued effort to improve our service to you, we feel it is worth mentioning there have been some recent recommended method detection level changes for Michigan Act 307 parameters (Ref. MERA #6, Revision #1 - 4/22/92). Most notably is the increase in the reporting limit in soil for the listed PCB Aroclors from 33. ug/Kg (dry weight basis) to 330. ug/Kg (dry weight basis).

All future analytical reports that request MI Act 307 D.L's will reflect these changes. If you have any questions please call your Project Manager or Customer Service Representative.



92.3155 1/9/92

Wendy Kuhn 932-0228

1/9

THE DRAGUN CORPORATION	30445 Northwestern Hy. Ste 260	Farmington Hills MI 48334	CHAIN OF CUSTODY RECORD
------------------------	-----------------------------------	------------------------------	-------------------------

PROJECT NO 1050		SITE NAME Hove Valley		NO OF CONTAINERS	METHOD 8010	METHOD 8248	REMARKS	
SAMPLERS (SIGNATURE): Wendy Kuhn	SAMPLES (SIGNATURE):	STATION NO	DATE TIME					COMP
1	6/5/92 10:20 ~					HVI-1	1 1	
2	10:25 a					HV2-1	1	
3	10:30 a					HV3-1	1	
4	10:40 a					HV4-1	1	
5	10:30 a					HV5-1	1	
6	10:45 a					HV6-1	1	
7	10:50 a					HV7-1	1	
8	10:50 a					HV8-1	1	
9	6/5/92 4:30 P					HVI-2	1 X*	Soil has been spiked w 200 ppm tetrachloroethylene (TCE)
10	4:35 P					HV2-2	1	+ looking to verify TCE was added; also any other VOC's found.
11	5:15 P					HV3-2	1	
12	5:25 P					HV4-2	1	
13	4:50 P					HV5-2	1	
RELINQUISHED BY (SIGNATURE): Wendy Kuhn	DATE/TIME 6/9/92 11:00	RECEIVED BY (SIGNATURE): Larry A. Good	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)			
RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):			
RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE): Carolyn Farlean	DATE/TIME	REMARKS: 6/9/92 12:30 PM				



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07/15/1992

RECEIVED JUL 20 1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3155  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE  
108027

SAMPLE DESCRIPTION  
#9 HV1-2 06/05

Bruce E. Brown  
Project Manager

Christopher P. Jack  
Division Manager



Bromotluorobenzene (BFB)

m/z	Ion Abundance Criteria	% Relative Abundance			Status
		Base Peak	Appropriate Peak		
50	15-40% of mass 95	16.49	16.49		Ok
75	30-60% of mass 95	49.08	49.08		Ok
95	Base peak, 100% relative abundance	100.00	100.00		Ok
96	5-9% of mass 95	7.05	7.05		Ok
173	Less than 2% of mass 174	0.00	0.00		Ok
174	Greater than 50% of mass 95	80.52	80.52		Ok
175	5-9% of mass 174	6.36	7.90		Ok
176	95-101% of mass 174	78.55	97.55		Ok
177	5-9% of mass 176	6.44	8.20		Ok

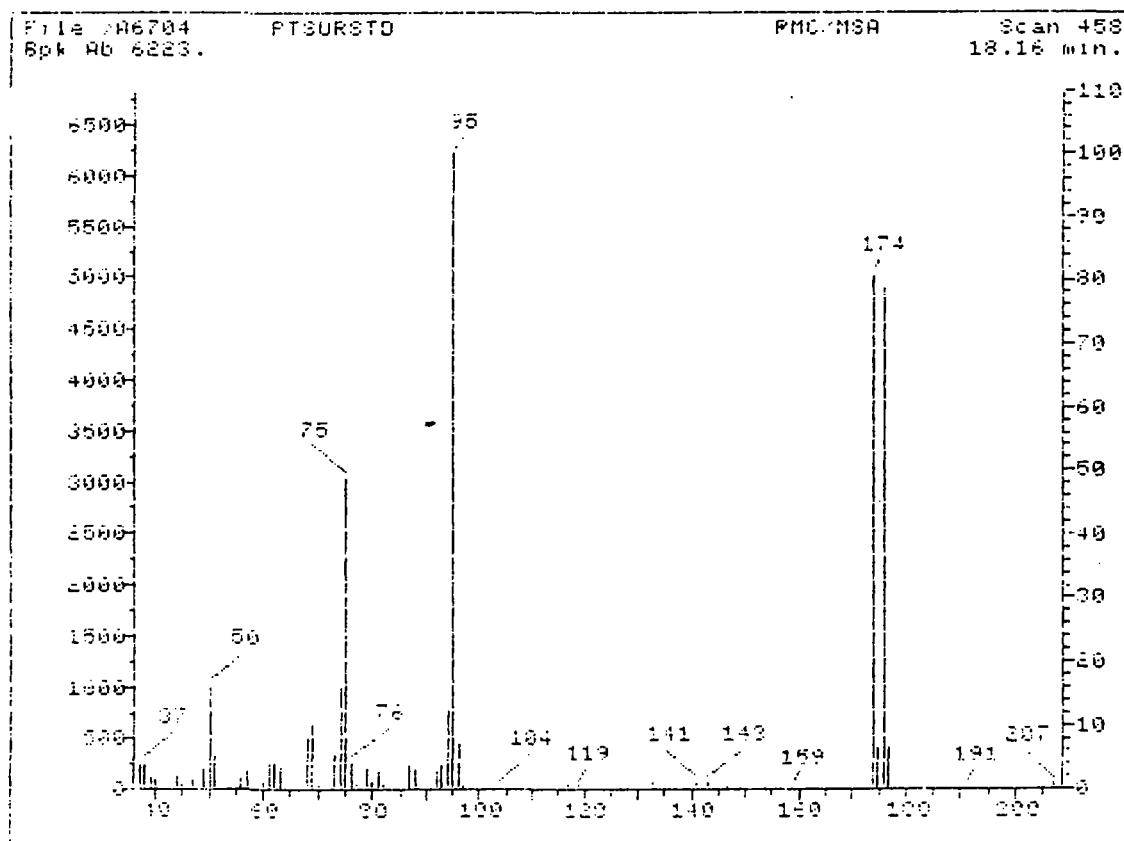
Injection Date: 06/17/92

Injection Time: 08:00

Data File: >A6704

Scan: 458

FMGR = AL



Continuing Calibration Check  
HSL Compounds

Site No:	Calibration Date: 06/17/92
Contractor:	Time: 08:40
Contract No:	Laboratory ID: >A6750
Instrument ID:	Initial Calibration Date: 06/09/92

Minimum RF for SPCC is                    Maximum % Diff for CCC is %

Compound	RF	RF	%Diff	CCC	SPCC
Chloromethane	.50180	.40947	18.40	**	
Vinyl chloride	.84985	.83109	2.21	*	
Bromomethane	1.15202	1.20432	4.54		
Chloroethane	.70960	.73395	3.43		
Methyl tert-butyl ether	3.12622	3.44142	10.08		
Trichlorofluoromethane	2.80920	2.95019	5.02		
Acrolein	.01989	.06789	241.39	✓	
1,1-Dichloroethene	1.25673	1.29204	2.81	*	
Carbon disulfide	3.37837	3.34975	.85		
Acetone	.10646	.13688	28.58	de	
Acrylonitrile	2.24073	2.38758	6.55		
1,1-thylene chloride	1.37245	1.49202	8.71		
-trans-Dichloroethene	1.46757	1.50513	2.56		
1,1-Dichloroethane	2.46977	2.55239	3.35	**	
1,2-cis-Dichloroethene	1.60550	1.62659	1.31		
Chloroform	3.20740	3.42280	6.72	*	
d4-1,2-Dichloroethane	1.94305	2.13916	10.09		(Conc=50.00)
1,2-Dichloroethane	1.98524	2.20713	11.18		
Vinyl acetate	.50875	.54143	6.42		
2-Butanone	.03690	.04996	35.39	de	100
1,1,1-Trichloroethane	.56670	.59120	4.32		
Benzene	.87505	.87348	.18		
Carbon tetrachloride	.49329	.51537	4.48		
1,2-Dichloropropane	.32631	.34437	5.54	*	
Trichloroethene	.37793	.37427	.97		
Bromodichloromethane	.58018	.61820	6.55		
2-Chloroethyl vinyl ether	.15369	.03888	74.70	de	
1,3-cis-Dichloropropene	.52067	.57445	10.33		(Conc=50.00)
1,3-trans-Dichloropropene	.43929	.42483	3.29		
1,1,2-Trichloroethane	.29760	.31631	6.29		
Dibromochloromethane	.46292	.50857	9.86		
Bromoform	.27137	.27837	2.58	**	

RF - Response Factor from daily standard file at 50.00 µg/L

RF - Average Response Factor from Initial Calibration Form VI

%ff - % Difference from original average or curve

CCC - Calibration Check Compounds (\*)      SPCC - System Performance Check Compounds (\*\*)

Continuing Calibration Check  
HPLC Compounds

Case No.: Calibration Dates: 08/17/91  
 Instrument: Model: 9890A  
 Contract No.: Laboratory ID: 98770  
 Instrument ID: Initial Calibration Dates: 08/09/91

Minimum RF for SPCC is      Maximum % Diff for CFF is %

Compound	<u>RF</u>	RF	%DIFF	CCC SPCC
$\alpha$ -Menthyl- $\gamma$ -pentanone	.46865	39590	15.52	
$\alpha$ -Toluene	1.20233	1.21406	.98	
Toluene	.76895	73498	4.42	*
$\gamma$ -Hexanone	.09550	10284	7.69	
Tetrachloroethene	38098	38873	2.04	
Chlorobenzene	.01058	93109	1.35	**
Ethylbenzene	.45873	41676	9.85	*
vinylbenzene	.55337	49843	9.6	(None=100.00)
Styrene	.92016	91408	1.65	
$\alpha$ -Julene	.54074	50942	5.71	
1,1,2-Tetrachloroethane	39581	42039	6.42	**
Bromochlorobenzene	.88012	.87207	.92	
1,3-Dichlorobenzene	.63856	.58176	9.89	
1-Dichlorobenzene	.62271	.52803	15.70	
-Dichlorobenzene	.50436	.37202	26.24	✓ not reported

RF - Response Factor from daily standard file at 50.00  $\mu$ g/l

RF - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CC - Calibration Check Compounds (\*)      SPCC - System Performance Check Compounds (\*\*)

8A  
VOLATILE INTERNAL STANDARD AREA SUMMARY

Lab Name: NET MIDWEST-AUBURN HILLS Contract: GCMS

Lab code: Case No.: VOA FOR SAS No.: SBD No.: TWS

Lab File ID (Standard): XA6750 Date Analyzed: 06/17/92

Instrument ID: 7002B Time Analyzed: 08:40

Matrix: (soil/water) WATER Level: (low/med) LOW Column: (pack/capi) CAP

	IS1(BCM)		IS2(DFB)		IS3(CHL)	
	AREA #	RT	AREA #	RT	AREA #	RT
12 HOUR STD	26322	5.20	130695	7.47	110220	14.86
UPPER LIMIT	52644	5.70	261390	7.97	220440	15.36
LOWER LIMIT	13161	4.70	65348	6.97	55110	14.36
EPA SAMPLE NO.						
1	23196	5.22	116458	7.49	96554	14.88
2	23090	5.22	114228	7.45	92415	14.88
3	21373	5.22	103444	7.45	81008	14.88
4	21917	5.18	105485	7.45	87508	14.88
5	21063	5.22	100011	7.45	82368	14.88
6	21271	5.23	96032	7.46	78412	14.89
7	19987	5.23	93544	7.46	75993	14.89
8	20684	5.23	97296	7.46	80100	14.89
9	18956	5.23	88578	7.46	75670	14.89
10	108027	5.20	96286	7.47	78581	14.90
11	19804	5.19	84633	7.46	76210	14.89
12	- 21127	5.18	93447	7.45	84476	14.88
13						
14						
15						
16						
17						
18						
19						
20						
21						
22						

IS1 (BCM) = Bromochloromethane  
 IS2 (DFB) = 1,4-Difluorobenzene  
 IS3 (CHL) = d5-Chlorobenzene

UPPER LIMIT = + 100%  
 of internal standard area.  
 LOWER LIMIT = - 50%  
 of internal standard area.

# Column used to flag internal standard area values with an asterisk



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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3155  
Job Description: Howe Valley

07/15/1992

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108027	1,2-Dichloroethane-d4	106
108027	Toluene-d8	104
108027	4-Bromofluorobenzene	90

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	76-114%	70-121%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	88-110%	81-117%	PNAH Compounds:	
Nitrobenzene-d5	86-115%	74-121%	2-Fluorobiphenyl	40-140%
2-Fluorobiphenyl	35-114%	23-120%	PCBs:	
Terphenyl-d14	43-116%	30-115%	Decachlorobiphenyl	
Phenol-d6	33-141%	18-137%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	10-94%	24-113%		
2,4,6-Tribromophenol	21-100%	25-121%		
	10-123%	19-122%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3156  
Sample No.: 108028

Project #1050  
Howe Valley

Sample Description: #10 HV2-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	77.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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06/19/1992  
Job No.: 92.3156  
Sample No.: 108028

Project #1050  
Howe Valley

Sample Description: #10 HV2-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/12/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Tetrachloroethene	120.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992  
Job No.: 92.3156  
Sample No.: 108028

Project #1050  
Howe Valley

Sample Description: #10 HV2-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3156  
Sample No.: 108029

Project #1050  
Howe Valley

Sample Description: #11 HV3-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3156  
Sample No.: 108029

Project #1050  
Howe Valley

Sample Description: #11 HV3-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/12/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Tetrachloroethene	1000.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3156  
Sample No.: 108029

Project #1050  
Howe Valley

Sample Description: #11 HV3-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3156  
Sample No.: 108030

Project #1050  
Howe Valley

Sample Description: #12 HV4-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3156  
Sample No.: 108030

Project #1050  
Howe Valley

Sample Description: #12 HV4-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/12/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Tetrachloroethene	650.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3156  
Sample No.: 108030

Project #1050  
Howe Valley

Sample Description: #12 HV4-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3156  
Sample No.: 108031

Project #1050  
Howe Valley

Sample Description: #13 HV5-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	77.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3156  
Sample No.: 108031

Project #1050  
Howe Valley

Sample Description: #13 HV5-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/12/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Tetrachloroethene	510.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3156  
Sample No.: 108031

Project #1050  
Howe Valley

Sample Description: #13 HV5-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3156  
Sample No.: 108032

Project #1050  
Howe Valley

Sample Description: #14 HV6-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	76.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3156  
Sample No.: 108032

Project #1050  
Howe Valley

Sample Description: #14 HV6-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/12/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Tetrachloroethene	280.	ug/Kg	06/12/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3156  
Sample No.: 108032

Project #1050  
Howe Valley

Sample Description: #14 HV6-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/12/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/12/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3156  
Sample No.: 108033

Project #1050  
Howe Valley

Sample Description: #15 HV7-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3156  
Sample No.: 108033

Project #1050  
Howe Valley

Sample Description: #15 HV7-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	300.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3156  
Sample No.: 108033

Project #1050  
Howe Valley

Sample Description: #15 HV7-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3156  
Sample No.: 108034

Project #1050  
Howe Valley

Sample Description: #16 HV8-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3156  
Sample No.: 108034

Project #1050  
Howe Valley

Sample Description: #16 HV8-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	250.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3156  
Sample No.: 108034

Project #1050  
Howe Valley

Sample Description: #16 HV8-2 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92.3156 1080 -108034

27

Wendy Kuhn 9320228

## CHAIN OF CUSTODY RECORD

THE DRAGUN CORPORATION 30445 Northwestern Hwy. Farmington Hills, MI 48334  
Suite 260

PROJECT NO 1050		SITE NAME Itrave Valley		NO OF CON. TAINERS	envelop 8010							REMARKS	
SAMPLERS (SIGNATURE) Wendy Kuhn	STATION NO	DATE 6/9/92	TIME 5:40 P	COMP	GRAB	STATION LOCATION HV6-2							
	14					HV6-2	1	1					After spiking soil, soil is processed soaking to encourage reatilization
	15					HV7-2	1						
	16					HV8-2	1	1					
	17	6/9/92	10:10 P			HV1-3	1	1					
	18		10:25 P			HV2-3	1						
	19		10:55 P			HV3-3	1						
	20		11:05 P			HV4-3	1						
	21		10:30 P			HV5-3	1						
	22		10:45 P			HV6-3	1						
	23		11:25 P			HV7-3	1						
	24		11:30 P			HV8-3	1						

RELINQUISHED BY (SIGNATURE) Wendy Kuhn	DATE/TIME 6/9/92 11:00	RECEIVED BY (SIGNATURE) Jerry J. Good	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY SIGNATURE Barry J. Paulean	DATE/TIME	REMARKS 6/9/92 11:30 pm	

92.3156 108028 - 108031

1.

Wendy Kuhn 932-0228

THE DRAGUN CORPORATION

30445 Northwestern Hy.  
Ste 260Farmington 1h 115 m, CHAIN OF CUSTODY RECORD  
4833 4

PROJECT NO 1050		SITE NAME Hove Valley		NO OF CONTAINERS	Method 8010	Method 8248	REMARKS				
SAMPLERS (SIGNATURE) <i>Wendy Kuhn</i>		STATION NO	DATE TIME				COMP	GRAB	STATION LOCATION		
1	6/5/92	10:20 ~			1	HV1-1	1				
2		10:25 ~				HV2-1	1				
3		10:30 ~				HV3-1	1				
4		10:40 ~				HV4-1	1				
5		10:30 ~				HV5-1	1				
6		10:45 ~				HV6-1	1				
7		10:50 ~				HV7-1	1				
8		10:50 ~			1	HV8-1	1				
9	6/5/92	4:30 P			1	HV1-2	1	X*			
10		4:35 P			1	HV2-2	1				
11		5:15 P			1	HV3-2	1				
12		5:25 P			1	HV4-2	1				
13		4:50 P			1	HV5-2	1				
RELINQUISHED BY (SIGNATURE) <i>Wendy Kuhn</i>		DATE/TIME 6-9-92 11:00	RECEIVED BY (SIGNATURE) <i>Jerry A. Hoad</i>		RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)			
RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)		RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)			
RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE) <i>Asst. Lab. Farlean</i>		DATE/TIME		REMARKS: 6-9-92 12:30 pm				



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06/30/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3156  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE	SAMPLE DESCRIPTION
108028	#10 HV2-2 06/05
108029	#11 HV3-2 06/05
108030	#12 HV4-2 06/05
108031	#13 HV5-2 06/05
108032	#14 HV6-2 06/05
108033	#15 HV7-2 06/05
108034	#16 HV8-2 06/05

Bruce E. Brown  
Project Manager

Christopher P. Jock  
Division Manager





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## QUALITY CONTROL REPORT

Client: THE DRAGUN CORPORATION

06/30/1992

Job Number: 92.3156

Job Description: Howe Valley

Sample Number: 108028 - 108032

Parameter	Units	Procedure Blank Observed Value	Laboratory Control Standard % Recovery	Continuing Calibration Verification Standard % Recovery
Methylene chloride	ug/Kg	<10.	NA	80
1,1 Dichloroethylene	ug/Kg	<10.	NA	95
Chloroform	ug/Kg	<10.	NA	100
1,1,1 Trichloroethane	ug/Kg	<10.	NA	80
Trichloroethylene	ug/Kg	<10.	NA	100
Tetrachloroethylene	ug/Kg	<10.	NA	85
Toluene	ug/Kg	<10.	NA	80
Ethyl Benzene	ug/Kg	<10.	NA	80
Xylene	ug/Kg	<10.	NA	80
Benzene	ug/Kg	<10.	NA	90

NA - Not Applicable

### Advisory Control Limits:

#### Inorganic Advisory Control Limits:

Procedure Blank - should be less than the reporting limit

Laboratory Control Standard 80 - 120%

Continuing Calibration Verification Standard 90 - 110%

#### Organic Advisory Control Limits:

Procedure Blank - should be less than the reporting limit

Laboratory Control Standard 60 - 130%

Continuing Calibration Verification Standard 80 - 120%





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## QUALITY CONTROL REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3156  
Job Description: Howe Valley  
Sample Number: 108033 - 108034

06/30/1992

Parameter	Units	Procedure Blank Observed Value	Laboratory Control Standard % Recovery	Continuing Calibration Verification Standard % Recovery
Methylene chloride	ug/Kg	<10.	NA	80
1,1 Dichloroethylene	ug/Kg	<10.	NA	80
Chloroform	ug/Kg	<10.	NA	90
1,1,1 Trichloroethane	ug/Kg	<10.	NA	85
Trichloroethylene	ug/Kg	<10.	NA	85
Tetrachloroethylene	ug/Kg	<10.	NA	80
Toluene	ug/Kg	<10.	NA	90
Ethyl Benzene	ug/Kg	<10.	NA	90
Xylene	ug/Kg	<10.	NA	90
Benzene	ug/Kg	<10.	NA	100

NA - Not Applicable

### Advisory Control Limits:

#### Inorganic Advisory Control Limits:

Procedure Blank - should be less than the reporting limit  
Laboratory Control Standard 80 - 120%  
Continuing Calibration Verification Standard 90 - 110%

#### Organic Advisory Control Limits:

Procedure Blank - should be less than the reporting limit  
Laboratory Control Standard 60 - 130%  
Continuing Calibration Verification Standard 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION

06/30/1992

Job Number: 92.3156

Job Description: Howe Valley

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108028	Chlorobutane	86
108029	Chlorobutane	97
108030	Chlorobutane	94
108031	Chlorobutane	103
108032	Chlorobutane	93
108033	Chlorobutane	96
108034	Chlorobutane	99

### Advisory Control Limits:

<u>GC/MS</u> (8240/8270)	<u>Matrix</u>		<u>GC</u>
	Water	Other	
1,2 Dichlorobenzene-d4	76-114%	70-121%	Chlorobutane
Toluene-d8	88-110%	81-117%	n-Propylbenzene
4-Bromofluorobenzene	86-115%	74-121%	4-Bromofluorobenzene
Nitrobenzene-d5	35-114%	23-120%	2-Fluorobiphenyl
2-Fluorobiphenyl	43-116%	30-115%	Decachlorobiphenyl
Terphenyl-d14	33-141%	18-137%	2,4,5,6-Tetrachloro-m-xylene
Phenol-d6	10-94%	24-113%	
2-Fluorophenol	21-100%	25-121%	
2,4,6-Tribromophenol	10-123%	19-122%	





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3158  
Sample No.: 108037

Project #1050  
Howe Valley

Sample Description: #17 HV1-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108037

Project #1050  
Howe Valley

Sample Description: #17 HV1-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3158  
Sample No.: 108037

Project #1050  
Howe Valley

Sample Description: #17 HV1-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3158  
Sample No.: 108038

Project #1050  
Howe Valley

Sample Description: #18 HV2-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	77.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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Job No.: 92.3158  
Sample No.: 108038

Project #1050  
Howe Valley

Sample Description: #18 HV2-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	240.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108038

Project #1050  
Howe Valley

Sample Description: #18 HV2-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108039

Project #1050  
Howe Valley

Sample Description: #19 HV3-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	69.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3158  
Sample No.: 108039

Project #1050  
Howe Valley

Sample Description: #19 HV3-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	300.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3158  
Sample No.: 108039

Project #1050  
Howe Valley

Sample Description: #19 HV3-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108040

Project #1050  
Howe Valley

Sample Description: #20 HV4-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	68.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108040

Project #1050  
Howe Valley

Sample Description: #20 HV4-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	1200.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3158  
Sample No.: 108040

Project #1050  
Howe Valley

Sample Description: #20 HV4-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108041

Project #1050  
Howe Valley

Sample Description: #21 HV5-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3158  
Sample No.: 108041

Project #1050  
Howe Valley

Sample Description: #21 HV5-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	260.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3158  
Sample No.: 108041

Project #1050  
Howe Valley

Sample Description: #21 HV5-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108042

Project #1050  
Howe Valley

Sample Description: #22 HV6-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108042

Project #1050  
Howe Valley

Sample Description: #22 HV6-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	170.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3158  
Sample No.: 108042

Project #1050  
Howe Valley

Sample Description: #22 HV6-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





NATIONAL  
ENVIRONMENTAL  
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Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326

Tel: (313) 391-2050  
Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3158  
Sample No.: 108043

Project #1050  
Howe Valley

Sample Description: #23 HV7-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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Project Manager





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06/19/1992  
Job No.: 92.3158  
Sample No.: 108043

Project #1050  
Howe Valley

Sample Description: #23 HV7-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	320.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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Wendy Kuhn  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108043

Project #1050  
Howe Valley

Sample Description: #23 HV7-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3158  
Sample No.: 108044

Project #1050  
Howe Valley

Sample Description: #24 HV8-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	69.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3158  
Sample No.: 108044

Project #1050  
Howe Valley

Sample Description: #24 HV8-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/16/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,2-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Tetrachloroethene	240.	ug/Kg	06/16/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/19/1992

Job No.: 92.3158  
Sample No.: 108044

Project #1050  
Howe Valley

Sample Description: #24 HV8-3 06/05

Date Taken: 06/05/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/16/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/16/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92-3158 / 7037-  
108011,  
247

Wendy Kuhn 932 0228

THE DRAGUN CORPORATION 30445 Northwestern Hwy. Farmington Hills, MI 48334 CHAIN OF CUSTODY RECORD  
SUIT 260

PROJECT NO		SITE NAME		NO OF CONTAINERS	CUSTODIAN SIGNATURE								REMARKS	
STATION NO	DATE	TIME	COMP	GRAB	HV6-2								After spiking soil, soil is processed soaking time to encourage volatilization	
14	6/9/92	5:00 p			HV6-2									
15		5:40 p			HV7-2									
16		5:50 p			HV8-2									
17	6/9/92	10:10 p			HV1-3									
18		10:25 p			HV2-3									
19		10:55 p			HV3-3									
20		11:05 p			HV4-3									
21		10:50 p			HV5-3									
22		10:45 p			HV6-3									
23		11:25 p			HV7-3									
24		11:30 p			HV8-3									

RELINQUISHED BY (SIGNATURE): <i>Wendy Kuhn</i>	DATE/TIME: 6/9/92 11:00	RECEIVED BY (SIGNATURE): <i>Terri J. Wool</i>	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): <i>Naheed Farhan</i>	DATE/TIME:	REMARKS: 6/9/92 11:30pm	



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08/11/1992

RECEIVED AUG 13 1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3158

PROJECT DESCRIPTION: Project #1050

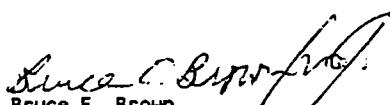
JOB DESCRIPTION: Howe Valley

NET SAMPLE

108037  
108038  
108039  
108040  
108041  
108042  
108043  
108044

SAMPLE DESCRIPTION

#17 HV1-3 06/05  
#18 HV2-3 06/05  
#19 HV3-3 06/05  
#20 HV4-3 06/05  
#21 HV5-3 06/05  
#22 HV6-3 06/05  
#23 HV7-3 06/05  
#24 HV8-3 06/05

  
Bruce E. Brown  
Project Manager

  
Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

08/11/1992

Job Number: 92.3158

Job Description: Howe Valley

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/L	<100	06/16/1992	njd
1,1 Dichloroethylene	ug/L	<100	06/16/1992	njd
Chloroform	ug/L	<100	06/16/1992	njd
1,1,1 Trichloroethane	ug/L	<100	06/16/1992	njd
Trichloroethylene	ug/L	<100	06/16/1992	njd
Tetrachloroethylene	ug/L	<100	06/16/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

08/11/1992

Job Number: 92.3158

Job Description: Howe Valley

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	80	06/16/1992	njd
1,1 Dichloroethylene	80	06/16/1992	njd
Chloroform	90	06/16/1992	njd
1,1,1 Trichloroethane	85	06/16/1992	njd
Trichloroethylene	85	06/16/1992	njd
Tetrachloroethylene	80	06/16/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3158  
Job Description: Howe Valley

08/11/1992

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108037	Chlorobutane	93
108038	Chlorobutane	97
108039	Chlorobutane	88
108040	Chlorobutane	98
108041	Chlorobutane	93
108042	Chlorobutane	95
108043	Chlorobutane	94
108044	Chlorobutane	90

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	76-114%	70-121%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	88-110%	81-117%	n-Propylbenzene	80-120%
Nitrobenzene-d5	86-115%	74-121%	<u>PNAH Compounds:</u>	
2-Fluorobiphenyl	35-114%	23-120%	2-Fluorobiphenyl	40-140%
Terphenyl-d14	43-116%	30-115%	<u>PCBs:</u>	
Phenol-d6	33-141%	18-137%	Decachlorobiphenyl	24-150%
2-Fluorophenol	10-94%	24-113%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2,4,6-Tribromophenol	21-100%	25-121%		
	10-123%	19-122%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3160  
Sample No.: 108045

Project #1050  
Howe Valley

Sample Description: #25 HV1-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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Wendy Kuhn  
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30445 Northwestern Highway  
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06/19/1992  
Job No.: 92.3160  
Sample No.: 108045

Project #1050  
Howe Valley

Sample Description: #25 HV1-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3160  
Sample No.: 108045

Project #1050  
Howe Valley

Sample Description: #25 HV1-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3160  
Sample No.: 108046

Project #1050  
Howe Valley

Sample Description: #26 HV2-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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Suite 260  
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06/19/1992

Job No.: 92.3160  
Sample No.: 108046

Project #1050  
Howe Valley

Sample Description: #26 HV2-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3160  
Sample No.: 108046

Project #1050  
Howe Valley

Sample Description: #26 HV2-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/19/1992

Job No.: 92.3160  
Sample No.: 108047

Project #1050  
Howe Valley

Sample Description: #27 HV3-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3160  
Sample No.: 108047

Project #1050  
Howe Valley

Sample Description: #27 HV3-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	300.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3160  
Sample No.: 108047

Project #1050  
Howe Valley

Sample Description: #27 HV3-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/19/1992

Job No.: 92.3160  
Sample No.: 108048

Project #1050  
Howe Valley

Sample Description: #28 HV4-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/19/1992

Job No.: 92.3160  
Sample No.: 108048

Project #1050  
Howe Valley

Sample Description: #28 HV4-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	130.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3160  
Sample No.: 108048

Project #1050  
Howe Valley

Sample Description: #28 HV4-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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06/19/1992

Job No.: 92.3160  
Sample No.: 108049

Project #1050  
Howe Valley

Sample Description: #29 HV5-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	77.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3160  
Sample No.: 108049

Project #1050  
Howe Valley

Sample Description: #29 HV5-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	120.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/19/1992

Job No.: 92.3160  
Sample No.: 108049

Project #1050  
Howe Valley

Sample Description: #29 HV5-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

BRUCE E. BROWN  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3160  
Sample No.: 108050

Project #1050  
Howe Valley

Sample Description: #30 HV6-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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06/19/1992

Job No.: 92.3160  
Sample No.: 108050

Project #1050  
Howe Valley

Sample Description: #30 HV6-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	110.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3160  
Sample No.: 108050

Project #1050  
Howe Valley

Sample Description: #30 HV6-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3160  
Sample No.: 108051

Project #1050  
Howe Valley

Sample Description: #31 HV7-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992  
Job No.: 92.3160  
Sample No.: 108051

Project #1050  
Howe Valley

Sample Description: #31 HV7-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	240.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3160  
Sample No.: 108052

Project #1050  
Howe Valley

Sample Description: #32 HV8-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	69.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992  
Job No.: 92.3160  
Sample No.: 108052

Project #1050  
Howe Valley

Sample Description: #32 HV8-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	320.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/19/1992

Job No.: 92.3160  
Sample No.: 108052

Project #1050  
Howe Valley

Sample Description: #32 HV8-4 06/06

Date Taken: 06/06/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



30t,

Worlshofen 932-0228

THE DRAGUN CORPORATION	30445 Northwestern Hwy. Site 260	Running 10/11/85, 10/1 48334	CHAIN OF CUSTODY RECORD
------------------------	-------------------------------------	---------------------------------	-------------------------

PROJECT NO	SITE NAME				NO OF CONTAINERS	Method 8010	REMARKS
1050	Hove Valley						
SAMPLERS (SIGNATURE)	<i>Wendy Lake</i>						
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION		
25	6/9/92	10:35	a	1	HV1-4	1	
26		10:40	a		HV2-4	1	
27		11:20	a		HV3-4	1	
28		11:30	a		HV4-4	1	
29		10:55	a		HV5-4	1	
30		11:05	a		HV6-4	1	
31		11:40	a		HV7-4	1	
32		11:50	a		HV8-4	1	
33	6/9/92	10:55	a	1	HV1-5	1	
34		11:05	a		HV2-5	1	
35		11:30	a		HV3-5	1	
36		11:45	a		HV4-5	1	
37		11:10	a		HV5-5	1	
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)			RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
<i>Wendy Lake</i>	6-9-92 1100	<i>Henry J. Roos</i>					
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)			RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)			DATE/TIME	REMARKS	
		<i>Barryn Parson</i>			6/9/92 12:30pm		



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RECEIVED  
8/11/92

Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326  
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08/11/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3160  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE	SAMPLE DESCRIPTION
108045	#25 HV1-4 06/06
108046	#26 HV2-4 06/06
108047	#27 HV3-4 06/06
108048	#28 HV4-4 06/06
108049	#29 HV5-4 06/06
108050	#30 HV6-4 06/06
108051	#31 HV7-4 06/06
108052	#32 HV8-4 06/06

*Bruce E. Brown / P.T.*  
Bruce E. Brown  
Project Manager

*Christopher P. Jock*  
Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3160  
Job Description: Howe Valley

08/11/1992

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/kg	<100	06/17/1992	njd
1,1 Dichloroethylene	ug/kg	<100	06/17/1992	njd
Chloroform	ug/kg	<100	06/17/1992	njd
1,1,1 Trichloroethane	ug/kg	<100	06/17/1992	njd
Trichloroethylene	ug/kg	<100	06/17/1992	njd
Tetrachloroethylene	ug/kg	<100	06/17/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3160  
Job Description: Howe Valley

08/11/1992

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	80	06/17/1992	njd
1,1 Dichloroethylene	85	06/17/1992	njd
Chloroform	90	06/17/1992	njd
1,1,1 Trichloroethane	90	06/17/1992	njd
Trichloroethylene	90	06/17/1992	njd
Tetrachloroethylene	90	06/17/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION

08/11/1992

Job Number: 92.3160

Job Description: Howe Valley

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108045	Chlorobutane	104
108046	Chlorobutane	99
108047	Chlorobutane	99
108048	Chlorobutane	102
108049	Chlorobutane	98
108050	Chlorobutane	95
108051	Chlorobutane	99
108052	Chlorobutane	97

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	76-114%	70-121%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	88-110%	81-117%	n-Propylbenzene	80-120%
Nitrobenzene-d5	86-115%	74-121%	<u>PNAH Compounds:</u>	
2-Fluorobiphenyl	35-114%	23-120%	2-Fluorobiphenyl	40-140%
Terphenyl-d14	43-116%	30-115%	<u>PCBs:</u>	
Phenol-d6	33-141%	18-137%	Decachlorobiphenyl	24-150%
2-Fluorophenol	10-94%	24-113%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2,4,6-Tribromophenol	21-100%	25-121%		
	10-123%	19-122%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108055

Project #1050  
Howe Valley

Sample Description: #33 HV1-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	77.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108055

Project #1050  
Howe Valley

Sample Description: #33 HV1-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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06/24/1992

Job No.: 92.3161  
Sample No.: 108055

Project #1050  
Howe Valley

Sample Description: #33 HV1-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown/CB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3161  
Sample No.: 108056

Project #1050  
Howe Valley

Sample Description: #34 HV2-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	77.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3161  
Sample No.: 108056

Project #1050  
Howe Valley

Sample Description: #34 HV2-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3161  
Sample No.: 108056

Project #1050  
Howe Valley

Sample Description: #34 HV2-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown / CLB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3161  
Sample No.: 108057

Project #1050  
Howe Valley

Sample Description: #35 HV3-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	69.	%	06/16/1992	rjk	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3161  
Sample No.: 108057

Project #1050  
Howe Valley

Sample Description: #35 HV3-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	250.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3161  
Sample No.: 108057

Project #1050  
Howe Valley

Sample Description: #35 HV3-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown / CBB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/24/1992

Job No.: 92.3161  
Sample No.: 108058

Project #1050  
Howe Valley

Sample Description: #36 HV4-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	69.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3161  
Sample No.: 108058

Project #1050  
Howe Valley

Sample Description: #36 HV4-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	420.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3161  
Sample No.: 108058

Project #1050  
Howe Valley

Sample Description: #36 HV4-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown/CB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/24/1992

Job No.: 92.3161  
Sample No.: 108059

Project #1050  
Howe Valley

Sample Description: #37 HV5-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	81.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108059

Project #1050  
Howe Valley

Sample Description: #37 HV5-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/17/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Tetrachloroethene	150.	ug/Kg	06/17/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3161  
Sample No.: 108059

Project #1050  
Howe Valley

Sample Description: #37 HV5-S 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/17/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/17/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown /CEB*  
Bruce E. Brown  
Project Manager





NATIONAL  
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TESTING, INC.

NET Midwest, Inc.  
Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326

Tel: (313) 391-2050  
Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108060

Project #1050  
Howe Valley

Sample Description: #38 HV6-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	76.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108060

Project #1050  
Howe Valley

Sample Description: #38 HV6-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108060

Project #1050  
Howe Valley

Sample Description: #38 HV6-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E Brown/CJS*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108061

Project #1050  
Howe Valley

Sample Description: #39 HV7-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	68.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108061

Project #1050  
Howe Valley

Sample Description: #39 HV7-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	160.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108061

Project #1050  
Howe Valley

Sample Description: #39 HV7-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown/CB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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06/24/1992

Job No.: 92.3161  
Sample No.: 108062

Project #1050  
Howe Valley

Sample Description: #40 HV8-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	72.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3161  
Sample No.: 108062

Project #1050  
Howe Valley

Sample Description: #40 HV8-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	210.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/24/1992

Job No.: 92.3161  
Sample No.: 108062

Project #1050  
Howe Valley

Sample Description: #40 HV8-5 06/07

Date Taken: 06/07/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown /C/S*  
Bruce E. Brown  
Project Manager





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92-3160-108051-108052  
 92-3161 108055 - 108051 4  
 Wendy Kuhn 932-0229

THE DRAGUN CORPORATION	30445 Northwestern Hwy. Suite 260	Farmington Hills, MI 48334	CHAIN OF CUSTODY RECORD
------------------------	--------------------------------------	-------------------------------	-------------------------

PROJECT NO 1050	SITE NAME Hove Valley				NO OF CON- TAINERS	REMARKS									
SAMPLER'S SIGNATURE: Wendy Kuhn	STATION NO	DATE	TIME	COMP		GRAB	STATION LOCATION	withd 8610							
	25	6/9/92	10:35	w		HV1-4	1	1							
	26		10:40	a		HV2-4	1								
	27		11:20	a		HV3-4	1								
	28		11:30	a		HV4-4	1								
	29		10:55	a		HV5-4	1								
	30		11:05	a		HV6-4	1								
	31		11:40	a		HV7-4	1								
	32		11:50	a		HV8-4	1								
	33	6/9/92	10:55	a		HV1-5	1	1							
	34		11:05	a		HV2-5	1								
	35		11:30	a		HV3-5	1								
	36		11:45	a		HV4-5	1								
	37		11:10	a		HV5-5	1								
RELINQUISHED BY (SIGNATURE): Wendy Kuhn	DATE/TIME 6-9-92 11:00	RECEIVED BY (SIGNATURE): Jerry F. Roach	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)										
RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE)	DATE/TIME:	RECEIVED BY (SIGNATURE)										
RELINQUISHED BY (SIGNATURE):	DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE): Marilyn Carlson	DATE/TIME:	REMARKS: 6/9/92 11:30 PM											

92-3161

108060-108062 471

Wendy Kohn 932-00228

Farmington Hills, MI CHAIN OF CUSTODY RECORD  
48334

THE DRAGUN CORPORATION

30445 Northwestern Hwy.  
Suite 260

PROJECT NO	SITE NAME				NO OF CON. TAINERS	REMARKS							
1050	Haw Valley				Method 8010								
SAMPLERS (SIGNATURE)													
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION								
38	6/19/92	11:20	a		HV6-5	1							
39		11:55	a		HV7-5	1							
40		12:05	p		HV8-5	1							
41	6/19/92	10:40	a		HV1-6	1							
42		11:50	a		HV2-6	1							
43		11:40	a		HV3-6	1							
44		11:50	a		HV4-6	1							
45		11:00	a		HV5-6	1							
46		11:15	a		HV6-6	1							
47		12:05	p		HV7-6	1							
48		12:20	p		HV8-6	1							

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
Wendy Kohn	6/19/92 11:00	Jerry A. Moore			
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE/TIME	REMARKS	
		Dawnlyn Pasleam	6/19/92 12:30 PM		



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08/04/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3161  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE	SAMPLE DESCRIPTION
108055	#33 HV1-5 06/07
108056	#34 HV2-5 06/07
108057	#35 HV3-5 06/07
108058	#36 HV4-5 06/07
108059	#37 HV5-5 06/07
108060	#38 HV6-5 06/07
108061	#39 HV7-5 06/07
108062	#40 HV8-5 06/07

Bruce E. Brown  
Project Manager

Christopher P. Jocke  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

08/04/1992

Job Number: 92.3161

Job Description: Howe Valley

Sample Number: 108055 - 108059

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<100	06/17/1992	njd
1,1 Dichloroethylene	ug/Kg	<100	06/17/1992	njd
Chloroform	ug/Kg	<100	06/17/1992	njd
1,1,1-Trichloroethane	ug/Kg	<100	06/17/1992	njd
Trichloroethylene	ug/Kg	<100	06/17/1992	njd
Tetrachloroethylene	ug/Kg	<100	06/17/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

08/04/1992

Job Number: 92.3161

Job Description: Howe Valley

Sample Number: 108060 - 108062

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<100	06/18/1992	njd
1,1 Dichloroethylene	ug/Kg	<100	06/18/1992	njd
Chloroform	ug/Kg	<100	06/18/1992	njd
1,1,1-Trichloroethane	ug/Kg	<100	06/18/1992	njd
Trichloroethylene	ug/Kg	<100	06/18/1992	njd
Tetrachloroethylene	ug/Kg	<100	06/18/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## LABORATORY CONTROL STANDARD REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3161  
Job Description: Howe Valley  
Sample Number: 108060 - 108062

08/04/1992

Parameter	Continuing	Date Analyzed	Lab Tech
	Calibration Verification		
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	80	06/17/1992	njd
1,1 Dichloroethylene	80	06/17/1992	njd
Chloroform	90	06/17/1992	njd
1,1,1-Trichloroethane	80	06/17/1992	njd
Trichloroethylene	80	06/17/1992	njd
Tetrachloroethylene	80	06/17/1992	njd

NA - Not Applicable

### Advisory Control Limits:

#### Inorganic:

Metals: 80 - 120%

Wet Chemistry: 80 - 120%

#### Organic:

##### Pesticides:

a-BHC	37 - 134%
g-BHC	17 - 147%
4,4'-DDD	31 - 141%
4,4'-DDT	25 - 160%
Dieldrin	36 - 146%
Endosulfan I	45 - 153%
Endrin	30 - 147%
Heptachlor	34 - 111%
PCBs	
Aroclor 1242	39 - 150%
Aroclor 1260	8 - 127%

##### PNAH Compounds:

Anthracene	40 - 140%
Benzo(b)fluoranthene	40 - 140%
Benzo(a)pyrene	40 - 140%
Fluoranthene	40 - 140%
Indeno(1,2,3-cd)pyrene	40 - 140%
Naphthalene	40 - 140%
Pyrene	40 - 140%

##### Herbicides:

2,4-D
2,4,5-TP





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3161  
Job Description: Howe Valley

08/04/1992

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108055	Chlorobutane	101
108056	Chlorobutane	99
108057	Chlorobutane	97
108058	Chlorobutane	96
108059	Chlorobutane	98
108060	Chlorobutane	105
108061	Chlorobutane	103
108062	Chlorobutane	101

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	88-110%	81-117%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	86-115%	74-121%	PNAH Compounds:	
Nitrobenzene-d5	35-114%	23-120%	2-Fluorobiphenyl	40-140%
2-Fluorobiphenyl	43-116%	30-115%	PCBs:	
Terphenyl-d14	33-141%	18-137%	Decachlorobiphenyl	
Phenol-d6	10-94%	24-113%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	21-100%	25-121%		
2,4,6-Tribromophenol	10-123%	19-122%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3163  
Sample No.: 108065

Project #1050  
Howe Valley

Sample Description: #41 HV1-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/24/1992

Job No.: 92.3163  
Sample No.: 108065

Project #1050  
Howe Valley

Sample Description: #41 HV1-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3163  
Sample No.: 108065

Project #1050  
Howe Valley

Sample Description: #41 HV1-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown / CLB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3163  
Sample No.: 108066

Project #1050  
Howe Valley

Sample Description: #42 HV2-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3163  
Sample No.: 108066

Project #1050  
Howe Valley

Sample Description: #42 HV2-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/24/1992

Job No.: 92.3163  
Sample No.: 108066

Project #1050  
Howe Valley

Sample Description: #42 HV2-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown /CIB*  
Bruce E. Brown  
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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
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06/24/1992

Job No.: 92.3163  
Sample No.: 108067

Project #1050  
Howe Valley

Sample Description: #43 HV3-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	69.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3163  
Sample No.: 108067

Project #1050  
Howe Valley

Sample Description: #43 HV3-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	190.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/24/1992

Job No.: 92.3163  
Sample No.: 108067

Project #1050  
Howe Valley

Sample Description: #43 HV3-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown/LLB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3163  
Sample No.: 108068

Project #1050  
Howe Valley

Sample Description: #44 HV4-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	68.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3163  
Sample No.: 108068

Project #1050  
Howe Valley

Sample Description: #44 HV4-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	160.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3163  
Sample No.: 108068

Project #1050  
Howe Valley

Sample Description: #44 HV4-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown /CB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3163  
Sample No.: 108069

Project #1050  
Howe Valley

Sample Description: #45 HV5-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
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Farmington Hills, MI 48334

06/24/1992

Job No.: 92.3163  
Sample No.: 108069

Project #1050  
Howe Valley

Sample Description: #45 HV5-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/24/1992

Job No.: 92.3163  
Sample No.: 108069

Project #1050  
Howe Valley

Sample Description: #45 HV5-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown /KB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/24/1992

Job No.: 92.3163  
Sample No.: 108070

Project #1050  
Howe Valley

Sample Description: #46 HV6-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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06/24/1992

Job No.: 92.3163  
Sample No.: 108070

Project #1050  
Howe Valley

Sample Description: #46 HV6-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
Suite 260  
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06/24/1992

Job No.: 92.3163  
Sample No.: 108070

Project #1050  
Howe Valley

Sample Description: #46 HV6-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown/CB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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06/24/1992

Job No.: 92.3163  
Sample No.: 108071

Project #1050  
Howe Valley

Sample Description: #47 HV7-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	68.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/24/1992

Job No.: 92.3163  
Sample No.: 108071

Project #1050  
Howe Valley

Sample Description: #47 HV7-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/24/1992

Job No.: 92.3163  
Sample No.: 108071

Project #1050  
Howe Valley

Sample Description: #47 HV7-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown /cbb*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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06/24/1992

Job No.: 92.3163  
Sample No.: 108072

Project #1050  
Howe Valley

Sample Description: #48 HV8-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	68.	%	06/19/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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06/24/1992

Job No.: 92.3163  
Sample No.: 108072

Project #1050  
Howe Valley

Sample Description: #48 HV8-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	160.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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06/24/1992

Job No.: 92.3163  
Sample No.: 108072

Project #1050  
Howe Valley

Sample Description: #48 HV8-6 06/08

Date Taken: 06/08/1992

Date Received: 06/09/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

*Bruce E. Brown / KLS*  
Bruce E. Brown  
Project Manager





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92.3163 108065 - 8072

47.

Wendy Kohn 932-40228

THE DRAGUN CORPORATION	30445 Northwestern Hwy: Suite 260	Farmington Hills, MI 48334	CHAIN OF CUSTODY RECORD
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PROJECT NO	SITE NAME					NO OF CON. TAINERS	REMARKS
SAMPLERS (SIGNATURE)	Haw Valley						
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION		
38	6/1/92	11:20	a		HV6-5	1	
39		11:55	a		HV7-5	1	
40		12:05	p		HV8-5	1	
41	6/8/92	10:40	a		HV1-6	1	
42		10:50	a		HV2-6	1	
43		11:40	a		HV3-6	1	
44		11:50	a		HV4-6	1	
45		11:00	a		HV5-6	1	
46		11:15	a		HV6-6	1	
47		12:05	p		HV7-6	1	
48		12:20	p		HV8-6	1	

RELINQUISHED BY (SIGNATURE): <i>Wendy Kohn</i>	DATE/TIME: 6/9/92 11:00	RECEIVED BY (SIGNATURE): <i>Jerry J. Gosselink</i>	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): <i>Wendy Kohn</i>	DATE/TIME:	REMARKS:	
			6/9/92 12:30 p.m.		



NATIONAL  
ENVIRONMENTAL  
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08/04/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3163  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE

108065  
108066  
108067  
108068  
108069  
108070  
108071  
108072

SAMPLE DESCRIPTION

#41 HV1-6 06/08  
#42 HV2-6 06/08  
#43 HV3-6 06/08  
#44 HV4-6 06/08  
#45 HV5-6 06/08  
#46 HV6-6 06/08  
#47 HV7-6 06/08  
#48 HV8-6 06/08

Bruce E. Brown  
Project Manager

Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

08/04/1992

Job Number: 92.3163

Job Description: Howe Valley

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<100	06/18/1992	njd
1,1 Dichloroethylene	ug/Kg	<100	06/18/1992	njd
Chloroform	ug/Kg	<100	06/18/1992	njd
1,1,1 Trichloroethane	ug/Kg	<100	06/18/1992	njd
Trichloroethylene	ug/Kg	<100	06/18/1992	njd
Tetrachloroethylene	ug/Kg	<100	06/18/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3163  
Job Description: Howe Valley

08/04/1992

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	80	06/18/1992	njd
1,1 Dichloroethylene	80	06/18/1992	njd
Chloroform	90	06/18/1992	njd
1,1,1 Trichloroethane	80	06/18/1992	njd
Trichloroethylene	80	06/18/1992	njd
Tetrachloroethylene	80	06/18/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3163  
Job Description: Howe Valley

08/04/1992

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108065	Chlorobutane	101
108066	Chlorobutane	95
108067	Chlorobutane	100
108068	Chlorobutane	88
108069	Chlorobutane	94
108070	Chlorobutane	98
108071	Chlorobutane	91
108072	Chlorobutane	94

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	88-110%	81-117%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	86-115%	74-121%	PNAH Compounds:	
Nitrobenzene-d5	35-114%	23-120%	2-Fluorobiphenyl	40-140%
2-Fluorobiphenyl	43-116%	30-115%	PCBs:	
Terphenyl-d14	33-141%	18-137%	Decachlorobiphenyl	
Phenol-d6	10-94%	24-113%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	21-100%	25-121%		
2,4,6-Tribromophenol	10-123%	19-122%		





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26 June 1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington MI 48334

**RE: Project #1050 Howe Valley**

Dear Ms Kuhn:

We wanted to inform you that the two jobs enclosed (NET #92.3250/92.3253) were inadvertently logged without the Total Solids test needed to calculate values for the positive hits. All but three samples were below the detection level of 100. ug/Kg which automatically compensates for the moisture. The three samples that had responses for Tetrachloroethene were subsequently run for total solids at no cost to you. The Total Solids values are not included on the analytical report but are listed below:

HV4-7	06/12	70.%	(108287)
HV3-8	06/12	71.%	(108296)
HV7-8	06/12	69.%	(108300)

We hope that this oversight will not cause undue inconvenience. The fact that these samples are not being billed for any Total Solids will cause a variation in the expected invoice amounts for these two jobs only.

sincerely,

NET INC



\_\_\_\_\_  
Bruce E. Brown  
Project Manager

BEB:clb





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108284

Project #1050  
Howe Valley

Sample Description: #1 HVI-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108284

Project #1050  
Howe Valley

Sample Description: #1 HVI-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/26/1992

Job No.: 92.3250  
Sample No.: 108285

Project #1050  
Howe Valley

Sample Description: #2 HV2-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108285

Project #1050  
Howe Valley

Sample Description: #2 HV2-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108286

Project #1050  
Howe Valley

Sample Description: #3 HV3-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/18/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108286

Project #1050  
Howe Valley

Sample Description: #3 HV3-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/18/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/18/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108287

Project #1050  
Howe Valley

Sample Description: #4 HV4-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	470.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





NATIONAL  
ENVIRONMENTAL  
TESTING, INC.

NET Midwest, Inc.  
Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326  
Tel: (313) 391-2050  
Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108287

Project #1050  
Howe Valley

Sample Description: #4 HV4-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108288

Project #1050  
Howe Valley

Sample Description: #5 HV5-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108288

Project #1050  
Howe Valley

Sample Description: #5 HV5-7 06/10

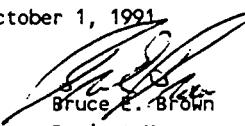
Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991

Results on a dry weight basis.

  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108289

Project #1050  
Howe Valley

Sample Description: #6 HV6-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108289

Project #1050  
Howe Valley

Sample Description: #6 HV6-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108290

Project #1050  
Howe Valley

Sample Description: #7 HV7-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108290

Project #1050  
Howe Valley

Sample Description: #7 HV7-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108291

Project #1050  
Howe Valley

Sample Description: #8 HV8-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3250  
Sample No.: 108291

Project #1050  
Howe Valley

Sample Description: #8 HV8-7 06/10

Date Taken: 06/10/1992

Date Received: 06/10/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92-3250  
108284-1, 791

Wendy Kuhn 9320228 172

THE DRAGUN CORPORATION	30445 Northwestern Hwy. Suite 260	Farmington Hills, MI 48334	CHAIN OF CUSTODY RECORD
------------------------	--------------------------------------	-------------------------------	-------------------------

PROJECT NO 1050		SITE NAME Howe Valley		NO OF CON. TAINERS	MATED 8010	REMARKS						
SAMPLERS (SIGNATURE) Wendy Kuhn												
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION							
1	6/10/92	10:05	a		HV1-7		1		1		Soils were spiked with Zn ppm	
2		10:25	a		HV2-7		1		1		PCE at time zero. Following	
3		11:05	a		HV3-7		1		1		manipulations, #7's are 5	
4		11:20	a		HV4-7		1		1		days, #8's are 7 days	
5		10:35	a		HV5-7		1		1			
6		10:50	a		HV6-7		1		1			
7		11:35	a		HV7-7		1		1			
8		11:55	a		HV8-7		1		1			
9	6/11/92	9:40	a		HV1-8		1		1			
10		10:15	a		HV2-8		1		1			
11		10:00	a		HV3-8		1		1			
12		11:00	a		HV4-8		1		1			
13		10:30	a		HV5-8		1		1			
RELINQUISHED BY (SIGNATURE) Wendy Kuhn			DATE/TIME 6-12-92 10:30		RECEIVED BY (SIGNATURE) John R. Barr		RELINQUISHED BY (SIGNATURE) John R. Barr		DATE/TIME 6-12 3:00		RECEIVED BY (SIGNATURE)	
RELINQUISHED BY (SIGNATURE)			DATE/TIME		RECEIVED BY (SIGNATURE)		RELINQUISHED BY (SIGNATURE)		DATE/TIME		RECEIVED BY (SIGNATURE)	
RELINQUISHED BY (SIGNATURE)			DATE/TIME		RECEIVED FOR LABORATORY BY (SIGNATURE) Wendy Kuhn		DATE/TIME		REMARKS			
									6/13/92 3:10 PM			



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08/04/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3250  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE	SAMPLE DESCRIPTION
108284	#1 HVI-7 06/10
108285	#2 HV2-7 06/10
108286	#3 HV3-7 06/10
108287	#4 HV4-7 06/10
108288	#5 HV5-7 06/10
108289	#6 HV6-7 06/10
108290	#7 HV7-7 06/10
108291	#8 HV8-7 06/10

Bruce E. Brown  
Project Manager

Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

08/04/1992

Job Number: 92.3250

Job Description: Howe Valley

Sample Number: 108284 - 108286

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
VOLATILE COMPOUNDS				
Methylene chloride	ug/Kg	<100	06/18/1992	njd
1,1 Dichloroethylene	ug/Kg	<100	06/18/1992	njd
Chloroform	ug/Kg	<100	06/18/1992	njd
1,1,1 Trichloroethane	ug/Kg	<100	06/18/1992	njd
Trichloroethylene	ug/Kg	<100	06/18/1992	njd
Tetrachloroethylene	ug/kg	<100	06/18/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

08/04/1992

Job Number: 92.3250

Job Description: Howe Valley

Sample Number: 108287 - 108291

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	90	06/19/1992	njd
1,1 Dichloroethylene	80	06/19/1992	njd
Chloroform	90	06/19/1992	njd
1,1,1 Trichloroethane	85	06/19/1992	njd
Trichloroethylene	90	06/19/1992	njd
Tetrachloroethylene	80	06/19/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3250  
Job Description: Howe Valley

08/04/1992

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108284	Chlorobutane	99
108285	Chlorobutane	95
108286	Chlorobutane	97
108287	Chlorobutane	106
108288	Chlorobutane	103
108289	Chlorobutane	106
108290	Chlorobutane	102
108291	Chlorobutane	114

### Advisory Control Limits:

GC/MS	Matrix		Volatile Compounds:	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	88-110%	81-117%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	86-115%	74-121%	PNAH Compounds:	
Nitrobenzene-d5	35-114%	23-120%	2-Fluorobiphenyl	40-140%
2-Fluorobiphenyl	43-116%	30-115%	PCBs:	
Terphenyl-d14	33-141%	18-137%	Decachlorobiphenyl	
Phenol-d6	10-94%	24-113%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	21-100%	25-121%		
2,4,6-Tribromophenol	10-123%	19-122%		





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26 June 1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington MI 48334

RE: Project #1050 Howe Valley

Dear Ms Kuhn:

We wanted to inform you that the two jobs enclosed (NET #92.3250/92.3253) were inadvertently logged without the Total Solids test needed to calculate values for the positive hits. All but three samples were below the detection level of 100. ug/Kg which automatically compensates for the moisture. The three samples that had responses for Tetrachloroethene were subsequently run for total solids at no cost to you. The Total Solids values are not included on the analytical report but are listed below:

HV4-7	06/12	70.%	(108287)
HV3-8	06/12	71.%	(108296)
HV7-8	06/12	69.%	(108300)

We hope that this oversight will not cause undue inconvenience. The fact that these samples are not being billed for any Total Solids will cause a variation in the expected invoice amounts for these two jobs only.

Sincerely,

NET INC

Bruce E. Brown  
Project Manager

BEB:clb





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992  
Job No.: 92.3253  
Sample No.: 108294

Project #1050  
Howe Valley

Sample Description: #9 HV1-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992  
Job No.: 92.3253  
Sample No.: 108294

Project #1050  
Howe Valley

Sample Description: #9 HV1-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/26/1992

Job No.: 92.3253  
Sample No.: 108295

Project #1050  
Howe Valley

Sample Description: #10 HV2-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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30445 Northwestern Highway  
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06/26/1992

Job No.: 92.3253  
Sample No.: 108295

Project #1050  
Howe Valley

Sample Description: #10 HV2-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/26/1992  
Job No.: 92.3253  
Sample No.: 108296

Project #1050  
Howe Valley

Sample Description: #11 HV3-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	370.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108296

Project #1050  
Howe Valley

Sample Description: #11 HV3-8 06/12

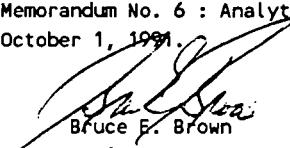
Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108297

Project #1050  
Howe Valley

Sample Description: #12 HV4-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108297

Project #1050  
Howe Valley

Sample Description: #12 HV4-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108298

Project #1050  
Howe Valley

Sample Description: #13 HV5-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108298

Project #1050  
Howe Valley

Sample Description: #13 HV5-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108299

Project #1050  
Howe Valley

Sample Description: #14 HV6-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108299

Project #1050  
Howe Valley

Sample Description: #14 HV6-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108300

Project #1050  
Howe Valley

Sample Description: #15 HV7-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	220.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108300

Project #1050  
Howe Valley

Sample Description: #15 HV7-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
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Farmington Hills, MI 48334

06/26/1992

Job No.: 92.3253  
Sample No.: 108301

Project #1050  
Howe Valley

Sample Description: #16 HV8-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/19/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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06/26/1992

Job No.: 92.3253  
Sample No.: 108301

Project #1050  
Howe Valley

Sample Description: #16 HV8-8 06/12

Date Taken: 06/12/1992

Date Received: 06/12/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/19/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/19/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 : Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## MICHIGAN ACT 307 REPORTING LIMIT UPDATE

In a continued effort to improve our service to you, we feel it is worth mentioning there have been some recent recommended method detection level changes for Michigan Act 307 parameters (Ref. MERA #6, Revision #1 - 4/22/92). Most notably is the increase in the reporting limit in soil for the listed PCB Aroclors from 33. ug/Kg (dry weight basis) to 330. ug/Kg (dry weight basis).

All future analytical reports that request MI Act 307 D.L's will reflect these changes. If you have any questions please call your Project Manager or Customer Service Representative.





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000





92-3253 10829

08301

Wendy Kuhn 9320228

182

THE DRAGUN CORPORATION	30445 Northwestern Hwy. Suite 260	Farmington Hills, MI 48334	CHAIN OF CUSTODY RECORD
------------------------	--------------------------------------	-------------------------------	-------------------------

PROJECT NO		SITE NAME		NO OF CONTAINERS	REMARKS								
STATION NO	DATE	TIME	COMP	GRAB	Marked 8/10								
1	6/12	10:05			HV1-7	1							Soils were spiked with Zn ppm
2		10:25			HV2-7	1							REE at time zero. Following manipulations. #7's are 5 days, #8's are 7 days
3		11:05			HV3-7	1							
4		11:20			HV4-7	1							
5		10:35			HV5-7	1							
6		10:50			HV6-7	1							
7		11:35			HV7-7	1							
8		11:55			HV8-7	1							
9	6/12	9:40			HV1-8	1							
10		10:15			HV2-8	1							
11		10:00			HV3-8	1							
12		11:00			HV4-8	1							
13		10:30			HV5-8	1							

RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)
<i>John D. Klein</i>		6-12-92 9:30	<i>Edgar Basy</i>	<i>Edgar Basy</i>		6-12 9:30	
RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)	DATE/TIME	REMARKS		
			<i>Wendy Kuhn</i>	6/12 9:30 PM			



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08/04/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3253

PROJECT DESCRIPTION: Project #1050

JOB DESCRIPTION: Howe Valley

NET SAMPLE

108294  
108295  
108296  
108297  
108298  
108299  
108300  
108301

SAMPLE DESCRIPTION

#9 HV1-8 06/12  
#10 HV2-8 06/12  
#11 HV3-8 06/12  
#12 HV4-8 06/12  
#13 HV5-8 06/12  
#14 HV6-8 06/12  
#15 HV7-8 06/12  
#16 HV8-8 06/12

Bruce E. Brown  
Project Manager

Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3253  
Job Description: Howe Valley

08/04/1992

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<100	06/19/1992	njd
1,1 Dichloroethylene	ug/Kg	<100	06/19/1992	njd
Chloroform	ug/Kg	<100	06/19/1992	njd
1,1,1 Trichloroethane	ug/Kg	<100	06/19/1992	njd
Trichloroethylene	ug/Kg	<100	06/19/1992	njd
Tetrachloroethylene	ug/Kg	<100	06/19/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

08/04/1992

Job Number: 92.3253

Job Description: Howe Valley

Parameter	Continuing Calibration Verification Standard		Lab Tech
	% Recovery	Date Analyzed	
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	90	06/19/1992	njd
1,1 Dichloroethylene	80	06/19/1992	njd
Chloroform	90	06/19/1992	njd
1,1,1 Trichloroethane	85	06/19/1992	njd
Trichloroethylene	90	06/19/1992	njd
Tetrachloroethylene	80	06/19/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3253  
Job Description: Howe Valley

08/04/1992

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108294	Chlorobutane	116
108295	Chlorobutane	110
108296	Chlorobutane	109
108297	Chlorobutane	104
108298	Chlorobutane	111
108299	Chlorobutane	112
108300	Chlorobutane	110
108301	Chlorobutane	112

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	76-114%	70-121%	Chlorobutane	80-120%
Toluene-d8	88-110%	81-117%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	86-115%	74-121%	<u>PNAH Compounds:</u>	
Nitrobenzene-d5	35-114%	23-120%	2-Fluorobiphenyl	40-140%
2-Fluorobiphenyl	43-116%	30-115%	<u>PCBs:</u>	
Terphenyl-d14	33-141%	18-137%	Decachlorobiphenyl	
Phenol-d6	10-94%	24-113%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	21-100%	25-121%		
2,4,6-Tribromophenol	10-123%	19-122%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3385  
Sample No.: 108614

Project #1050  
Howe Valley

Sample Description: #1 HV1-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79..	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/30/1992

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Project #1050  
Howe Valley

Sample Description: #1 HV1-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/30/1992

Job No.: 92.3385  
Sample No.: 108614

Project #1050  
Howe Valley

Sample Description: #1 HV1-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
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06/30/1992

Job No.: 92.3385  
Sample No.: 108615

Project #1050  
Howe Valley

Sample Description: #2 HV2-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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06/30/1992

Job No.: 92.3385  
Sample No.: 108615

Project #1050  
Howe Valley

Sample Description: #2 HV2-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/30/1992

Job No.: 92.3385  
Sample No.: 108615

Project #1050  
Howe Valley

Sample Description: #2 HV2-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3385  
Sample No.: 108616

Project #1050  
Howe Valley

Sample Description: #3 HV3-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3385  
Sample No.: 108616

Project #1050  
Howe Valley

Sample Description: #3 HV3-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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06/30/1992

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Sample No.: 108616

Project #1050  
Howe Valley

Sample Description: #3 HV3-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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06/30/1992

Job No.: 92.3385  
Sample No.: 108617

Project #1050  
Howe Valley

Sample Description: #4 HV4-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3385  
Sample No.: 108617

Project #1050  
Howe Valley

Sample Description: #4 HV4-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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Project Manager





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06/30/1992

Job No.: 92.3385  
Sample No.: 108617

Project #1050  
Howe Valley

Sample Description: #4 HV4-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3385  
Sample No.: 108618

Project #1050  
Howe Valley

Sample Description: #5 HV5-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





NATIONAL  
ENVIRONMENTAL  
TESTING, INC.

NET Midwest, Inc.  
Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326  
Tel: (313) 391-2050  
Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3385  
Sample No.: 108618

Project #1050  
Howe Valley

Sample Description: #5 HV5-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
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Sample No.: 108618

Project #1050  
Howe Valley

Sample Description: #5 HV5-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3385  
Sample No.: 108619

Project #1050  
Howe Valley

Sample Description: #6 HV6-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992  
Job No.: 92.3385  
Sample No.: 108619

Project #1050  
Howe Valley

Sample Description: #6 HV6-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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06/30/1992

Job No.: 92.3385  
Sample No.: 108619

Project #1050  
Howe Valley

Sample Description: #6 HV6-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3385  
Sample No.: 108620

Project #1050  
Howe Valley

Sample Description: #7 HV7-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3385  
Sample No.: 108620

Project #1050  
Howe Valley

Sample Description: #7 HV7-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	220.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3385  
Sample No.: 108620

Project #1050  
Howe Valley

Sample Description: #7 HV7-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3385  
Sample No.: 108621

Project #1050  
Howe Valley

Sample Description: #8 HV8-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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06/30/1992

Job No.: 92.3385  
Sample No.: 108621

Project #1050  
Howe Valley

Sample Description: #8 HV8-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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Sample No.: 108621

Project #1050  
Howe Valley

Sample Description: #8 HV8-9 06/15

Date Taken: 06/15/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92.3385 108614

10.6.21

Wendy Kuhn 9320228

THE DRAGUN CORPORATION	30445 Northwestern Hwy. Suite 260	Farmington Hills, MI 48334	CHAIN OF CUSTODY RECORD
------------------------	--------------------------------------	-------------------------------	-------------------------

PROJECT NO 1050		SITE NAME Howe Valley		NO OF CONTAINERS	RECEIVED BY 8010 Wendy Kuhn	REMARKS									
STATION NO	DATE	TIME	COMP			GRAB	STATION LOCATION								
1	6/5/92	10:10	a		HV1-9										Samples "9" are dry 12 and "10" are clay 15 g continuing expt: (spiked soil with 200 ppm PCE)
2	1	10:10	a		HV2-9										
3		10:55	a		HV3-9										
4		11:15	a		HV4-9										
5		10:30	a		HV5-9										
6		10:40	a		HV6-9										
7		11:55	a		HV7-9										
8		11:50	a		HV8-9										
9	6/8/92	9:30	a		HV1-10										
10		9:40	a		HV2-10										
11		10:20	a		HV3-10										
12		10:40	a		HV4-10										
13		9:55	a		HV5-10										
RELINQUISHED BY (SIGNATURE): <i>Wendy Kuhn</i>		DATE/TIME: 6/19/92 12:30		RECEIVED BY (SIGNATURE): <i>John York</i>		RELINQUISHED BY (SIGNATURE):		DATE/TIME:		RECEIVED BY (SIGNATURE):					
RELINQUISHED BY (SIGNATURE):		DATE/TIME:		RECEIVED BY (SIGNATURE):		RELINQUISHED BY (SIGNATURE):		DATE/TIME:		RECEIVED BY (SIGNATURE):					
RELINQUISHED BY (SIGNATURE):		DATE/TIME:		RECEIVED FOR LABORATORY BY SIGNATURE: <i>Wendy Kuhn</i>		DATE/TIME:		REMARKS:							
						(6/19/92) 1:30 PM									



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08/04/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3385  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE  
108614  
108615  
108616  
108617  
108618  
108619  
108620  
108621

SAMPLE DESCRIPTION  
#1 HV1-9 06/15  
#2 HV2-9 06/15  
#3 HV3-9 06/15  
#4 HV4-9 06/15  
#5 HV5-9 06/15  
#6 HV6-9 06/15  
#7 HV7-9 06/15  
#8 HV8-9 06/15

Bruce E. Brown  
Project Manager

Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3385  
Job Description: Howe Valley

08/04/1992

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<100	06/23/1992	njd
1,1 Dichloroethylene	ug/Kg	<100	06/23/1992	njd
Chloroform	ug/Kg	<100	06/23/1992	njd
1,1,1 Trichloroethane	ug/Kg	<100	06/23/1992	njd
Trichloroethylene	ug/Kg	<100	06/23/1992	njd
Tetrachloroethylene	ug/Kg	<100	06/23/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

08/04/1992

Job Number: 92.3385

Job Description: Howe Valley

Parameter	Continuing Calibration Verification Standard	Date Analyzed	Lab Tech
	% Recovery		
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	80	06/23/1992	njd
1,1 Dichloroethylene	84	06/23/1992	njd
Chloroform	96	06/23/1992	njd
1,1,1 Trichloroethane	92	06/23/1992	njd
Trichloroethylene	80	06/23/1992	njd
Tetrachloroethylene	80	06/23/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3385  
Job Description: Howe Valley

08/04/1992

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108614	Chlorobutane	101
108615	Chlorobutane	96
108616	Chlorobutane	95
108617	Chlorobutane	100
108618	Chlorobutane	100
108619	Chlorobutane	95
108620	Chlorobutane	89
108621	Chlorobutane	101

### Advisory Control Limits:

GC/MS	Matrix		Volatile Compounds:	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	76-114%	70-121%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	88-110%	81-117%	PNAH Compounds:	
Nitrobenzene-d5	86-115%	74-121%	2-Fluorobiphenyl	40-140%
2-Fluorobiphenyl	35-114%	23-120%	PCBs:	
Terphenyl-d14	43-116%	30-115%	Decachlorobiphenyl	
Phenol-d6	33-141%	18-137%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	10-94%	24-113%		
2,4,6-Tribromophenol	21-100%	25-121%		
	10-123%	19-122%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3387  
Sample No.: 108623

Project #1050  
Howe Valley

Sample Description: #9 HV1-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	82.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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06/30/1992

Job No.: 92.3387  
Sample No.: 108623

Project #1050  
Howe Valley

Sample Description: #9 HV1-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

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Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/30/1992

Job No.: 92.3387  
Sample No.: 108623

Project #1050  
Howe Valley

Sample Description: #9 HV1-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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## ANALYTICAL REPORT

Wendy Kuhn  
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06/30/1992

Job No.: 92.3387  
Sample No.: 108624

Project #1050  
Howe Valley

Sample Description: #10 HV2-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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30445 Northwestern Highway  
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06/30/1992

Job No.: 92.3387  
Sample No.: 108624

Project #1050  
Howe Valley

Sample Description: #10 HV2-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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06/30/1992

Job No.: 92.3387  
Sample No.: 108624

Project #1050  
Howe Valley

Sample Description: #10 HV2-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108625

Project #1050  
Howe Valley

Sample Description: #11 HV3-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/29/1992	cms	160.3 (3)

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Results on a dry weight basis.

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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108625

Project #1050  
Howe Valley

Sample Description: #11 HV3-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108625

Project #1050  
Howe Valley

Sample Description: #11 HV3-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

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Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3387  
Sample No.: 108626

Project #1050  
Howe Valley

Sample Description: #12 HV4-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

06/30/1992

Job No.: 92.3387  
Sample No.: 108626

Project #1050  
Howe Valley

Sample Description: #12 HV4-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
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06/30/1992

Job No.: 92.3387  
Sample No.: 108626

Project #1050  
Howe Valley

Sample Description: #12 HV4-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992  
Job No.: 92.3387  
Sample No.: 108627

Project #1050  
Howe Valley

Sample Description: #13 HV5-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	80.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108627

Project #1050  
Howe Valley

Sample Description: #13 HV5-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108627

Project #1050  
Howe Valley

Sample Description: #13 HV5-10 06/18

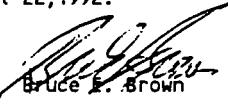
Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

  
Bruce A. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108628

Project #1050  
Howe Valley

Sample Description: #14 HV6-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	80.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992  
Job No.: 92.3387  
Sample No.: 108628

Project #1050  
Howe Valley

Sample Description: #14 HV6-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108628

Project #1050  
Howe Valley

Sample Description: #14 HV6-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108629

Project #1050  
Howe Valley

Sample Description: #15 HV7-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	70.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108629

Project #1050  
Howe Valley

Sample Description: #15 HV7-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/23/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Tetrachloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108629

Project #1050  
Howe Valley

Sample Description: #15 HV7-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/23/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/23/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992

Job No.: 92.3387  
Sample No.: 108630

Project #1050  
Howe Valley

Sample Description: #16 HV8-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	06/29/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
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06/30/1992

Job No.: 92.3387  
Sample No.: 108630

Project #1050  
Howe Valley

Sample Description: #16 HV8-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Bromoform	<200.	ug/Kg	06/24/1992	njd	8010 (1)
Bromomethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Carbon tetrachloride	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Chlorobenzene	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Chloroethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Chloroform	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Chloromethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Dibromochloromethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
1,2-Dichlorobenzene	<100.	ug/Kg	06/24/1992	njd	8010 (1)
1,3-Dichlorobenzene	<100.	ug/Kg	06/24/1992	njd	8010 (1)
1,4-Dichlorobenzene	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Dichlorodifluoromethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
1,1-Dichloroethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
1,2-Dichloroethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
1,1-Dichloroethene	<100.	ug/Kg	06/24/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<100.	ug/Kg	06/24/1992	njd	8010 (1)
1,2-Dichloropropane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<100.	ug/Kg	06/24/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Methylene chloride	<100.	ug/Kg	06/24/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Tetrachloroethene	300.	ug/Kg	06/24/1992	njd	8010 (1)
1,1,1-Trichloroethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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06/30/1992  
Job No.: 92.3387  
Sample No.: 108630

Project #1050  
Howe Valley

Sample Description: #16 HV8-10 06/18

Date Taken: 06/18/1992

Date Received: 06/19/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Trichloroethene	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Trichlorofluoromethane	<100.	ug/Kg	06/24/1992	njd	8010 (1)
Vinyl chloride	<100.	ug/Kg	06/24/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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#### **METHODOLOGY**

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

#### **UNITS OF CONVERSION**

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92.3387 1^8623-

.. 8630

Wendy Kuhn 9320228

THE DRAGUN CORPORATION	30445 Northwestern Hwy. Suite 260	Farmington Hills, MI 48334	CHAIN OF CUSTODY RECORD
------------------------	--------------------------------------	-------------------------------	-------------------------

PROJECT NO 1050		SITE NAME Howe Valley		NO. OF CON. TAINERS	REMARKS								
SAMPLERS (SIGNATURE).					Noted 8/10								
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION								
1	6/18/92	10:00 a			HV1-9		1						Samples "9" are day 12 and "10" are day 15 of continuing expt. (spiked soil with 200 ppm PCE)
2		10:10 a			HV2-9		1						
3		10:55 a			HV3-9		1						
4		11:15 a			HV4-9		1						
5		10:30 a			HV5-9		1						
6		10:40 a			HV6-9		1						
7		11:55 a			HV7-9		1						
8		11:50 a			HV8-9		1						
9	6/18/92	9:30 a			HV1-10		1						
10		9:40 a			HV2-10		1						
11		10:20 a			HV3-10		1						
12		10:40 a			HV4-10		1						
13		9:55 a			HV5-10		1						
RELINQUISHED BY (SIGNATURE): <i>Wendy Kuhn</i>				DATE/TIME 6/19/92 10:30	RECEIVED BY (SIGNATURE): <i>John York</i>		RELINQUISHED BY (SIGNATURE):		DATE/TIME	RECEIVED BY (SIGNATURE):			
RELINQUISHED BY (SIGNATURE):				DATE/TIME	RECEIVED BY (SIGNATURE):		RELINQUISHED BY (SIGNATURE):		DATE/TIME	RECEIVED BY (SIGNATURE):			
RELINQUISHED BY (SIGNATURE):				DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE): <i>Wendy Kuhn</i>		DATE/TIME	REMARKS: 6/19/92 1:00 PM					

Wendy Kuhn 932 02.28

30445 Northwestern Hwy.

THE DRAGUN CORPORATION

Suite 260

Farmington Hills, MI  
48334

## CHAIN OF CUSTODY RECORD

PROJECT NO <u>1050</u>		SITE NAME <u>Hawke Valley</u>		NO OF CONTAINERS <u>1</u>	REMARKS						
SAMPLERS (SIGNATURE) <u>Wendy Kuhn</u>					<u>Mixed 8010</u>						
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION						
14	6/19/92	10:05	a		HV6-10						
15		10:55	a		HV7-10						
16		11:10			HV8-10						
RELINQUISHED BY (SIGNATURE) <u>Wendy Kuhn</u>		DATE/TIME <u>6/19/92 12:30</u>	RECEIVED BY (SIGNATURE) <u>John York</u>		RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)			
RELINQUISHED BY (SIGNATURE):		DATE/TIME	RECEIVED BY (SIGNATURE):		RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)			
RELINQUISHED BY (SIGNATURE):		DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE) <u>David PasLean</u>		DATE/TIME	REMARKS <u>6/19/92 1:30 PM</u>					



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08/04/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3387  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE	SAMPLE DESCRIPTION
108623	#9 HV1-10 06/18
108624	#10 HV2-10 06/18
108625	#11 HV3-10 06/18
108626	#12 HV4-10 06/18
108627	#13 HV5-10 06/18
108628	#14 HV6-10 06/18
108629	#15 HV7-10 06/18
108630	#16 HV8-10 06/18

Bruce E. Brown  
Project Manager

Christopher R. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

08/04/1992

Job Number: 92.3387

Job Description: Howe Valley

Sample Numbers: 108623-108629

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<100	06/23/1992	njd
1,1 Dichloroethylene	ug/Kg	<100	06/23/1992	njd
Chloroform	ug/Kg	<100	06/23/1992	njd
1,1,1 Trichloroethane	ug/Kg	<100	06/23/1992	njd
Trichloroethylene	ug/Kg	<100	06/23/1992	njd
Tetrachloroethylene	ug/Kg	<100	06/23/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3387  
Job Description: Howe Valley  
Sample Numbers: 108623-108629

08/04/1992

Parameter	Continuing Calibration Verification		Lab Tech
	Standard % Recovery	Date Analyzed	
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	80	6/23/1992	njd
1,1 Dichloroethylene	84	6/23/1992	njd
Chloroform	96	6/23/1992	njd
1,1,1 Trichloroethane	92	6/23/1992	njd
Trichloroethylene	80	6/23/1992	njd
Tetrachloroethylene	80	6/23/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3387  
Job Description: Howe Valley

08/04/1992

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108623	Chlorobutane	94
108624	Chlorobutane	99
108625	Chlorobutane	90
108626	Chlorobutane	97
108627	Chlorobutane	95
108628	Chlorobutane	95
108629	Chlorobutane	99
108630	Chlorobutane	105

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	76-114%	70-121%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	88-110%	81-117%	<u>PNAH Compounds:</u>	
Nitrobenzene-d5	86-115%	74-121%	2-Fluorobiphenyl	40-140%
2-Fluorobiphenyl	35-114%	23-120%	<u>PCBs:</u>	
Terphenyl-d14	43-116%	30-115%	Decachlorobiphenyl	
Phenol-d6	33-141%	18-137%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	10-94%	24-113%		
2,4,6-Tribromophenol	21-100%	25-121%		
	10-123%	19-122%		





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*RECEIVED JUL 16 1992*

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/13/1992

Job No.: 92.3507  
Sample No.: 108896

Project #1050  
Howe Valley

Sample Description: #1 HV1-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	81.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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07/13/1992

Job No.: 92.3507  
Sample No.: 108896

Project #1050  
Howe Valley

Sample Description: #1 HV1-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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Farmington Hills, MI 48334

07/13/1992

Job No.: 92.3507  
Sample No.: 108896

Project #1050  
Howe Valley

Sample Description: #1 HV1-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown KLB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
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07/13/1992

Job No.: 92.3507  
Sample No.: 108897

Project #1050  
Howe Valley

Sample Description: #2 HV2-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	81.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/13/1992

Job No.: 92.3507  
Sample No.: 108897

Project #1050  
Howe Valley

Sample Description: #2 HV2-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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07/13/1992

Job No.: 92.3507  
Sample No.: 108897

Project #1050  
Howe Valley

Sample Description: #2 HV2-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown P.E.*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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07/13/1992

Job No.: 92.3507  
Sample No.: 108898

Project #1050  
Howe Valley

Sample Description: #3 HV3-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992  
Job No.: 92.3507  
Sample No.: 108898

Project #1050  
Howe Valley

Sample Description: #3 HV3-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
Suite 260  
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07/13/1992

Job No.: 92.3507  
Sample No.: 108898

Project #1050  
Howe Valley

Sample Description: #3 HV3-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108899

Project #1050  
Howe Valley

Sample Description: #4 HV4-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108899

Project #1050  
Howe Valley

Sample Description: #4 HV4-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	30.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108899

Project #1050  
Howe Valley

Sample Description: #4 HV4-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown, KLBB  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108900

Project #1050  
Howe Valley

Sample Description: #5 HV5-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	82.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108900

Project #1050  
Howe Valley

Sample Description: #5 HV5-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108900

Project #1050  
Howe Valley

Sample Description: #5 HV5-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /CLB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108901

Project #1050  
Howe Valley

Sample Description: #6 HV6-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	81.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108901

Project #1050  
Howe Valley

Sample Description: #6 HV6-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108901

Project #1050  
Howe Valley

Sample Description: #6 HV6-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown/KB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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07/13/1992

Job No.: 92.3507  
Sample No.: 108902

Project #1050  
Howe Valley

Sample Description: #7 HV7-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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07/13/1992

Job No.: 92.3507  
Sample No.: 108902

Project #1050  
Howe Valley

Sample Description: #7 HV7-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/13/1992

Job No.: 92.3507  
Sample No.: 108902

Project #1050  
Howe Valley

Sample Description: #7 HV7-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown/KB*  
Bruce E. Brown  
Project Manager





NATIONAL  
ENVIRONMENTAL  
TESTING, INC.

NET Midwest, Inc.  
Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326

Tel: (313) 391-2050  
Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/13/1992

Job No.: 92.3507  
Sample No.: 108903

Project #1050  
Howe Valley

Sample Description: #8 HV8-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	71.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/13/1992  
Job No.: 92.3507  
Sample No.: 108903

Project #1050  
Howe Valley

Sample Description: #8 HV8-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
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07/13/1992

Job No.: 92.3507  
Sample No.: 108903

Project #1050  
Howe Valley

Sample Description: #8 HV8-11 06/21

Date Taken: 06/21/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /CB*  
Bruce E. Brown  
Project Manager





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



923507 138896 -138923

Wendy Kuhn 932 0228

THE DRAGUN CORPORATION	20445 Northwestern Hwy Suite 260	Toronto, Ont. M1S 1S1 48334	CHAIN OF CUSTODY RECORD
------------------------	-------------------------------------	-----------------------------------	-------------------------

PROJECT NO	SITE NAME					NO OF CON- TAINERS	REMARKS	
1050	Hove Valley							8010
SAMPLERS (SIGNATURE)								
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION			
1	6/24/92	10:55			HV1-11	1	continuation of Hove valley	
2		11:00			HV2-11	1	study # 11's day 16	
3		11:35			HV3-11	1	# 12's day 19	
4		11:50			HV4-11	1		
5		11:10			HV5-11	1		
6		11:20			HV6-11	1		
7		12:00			HV7-11	1		
8		12:15			HV8-11	1		
9	6/24/92	9:35			HV1-12	1		
10		9:40			HV2-12	1		
11		10:15			HV3-12	1		
12		10:25			HV4-12	1		
13		9:55			HV5-12	1		
RELINQUISHED BY (SIGNATURE)	DATE/TIME		RECEIVED BY (SIGNATURE)		RELINQUISHED BY (SIGNATURE)	DATE/TIME		RECEIVED BY (SIGNATURE)
Wendy Kuhn	6-25	1:00	By Paul Banay					
RELINQUISHED BY (SIGNATURE)	DATE/TIME		RECEIVED BY (SIGNATURE)		RELINQUISHED BY (SIGNATURE)	DATE/TIME		RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE/TIME		RECEIVED FOR LABORATORY BY (SIGNATURE)		DATE/TIME	REMARKS		
			Carolyn Paslean		6/25/92			



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07/13/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
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Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3507  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE  
108896  
108897  
108898  
108899  
108900  
108901  
108902  
108903

SAMPLE DESCRIPTION  
#1 HV1-11 06/21  
#2 HV2-11 06/21  
#3 HV3-11 06/21  
#4 HV4-11 06/21  
#5 HV5-11 06/21  
#6 HV6-11 06/21  
#7 HV7-11 06/21  
#8 HV8-11 06/21

*Bruce Brown/CB*  
Bruce E. Brown  
Project Manager

*Christopher P. Jock*  
Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

07/13/1992

Job Number: 92.3507

Job Description: Howe Valley

Sample Number: 108896; 108898 - 108903

Parameter	Units	Procedure			
		Blank	Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>					
Methylene chloride	ug/Kg	<20		07/07/1992	njd
1,1 Dichloroethylene	ug/Kg	<20		07/07/1992	njd
Chloroform	ug/Kg	<20		07/07/1992	njd
1,1,1-Trichloroethane	ug/Kg	<20		07/07/1992	njd
Trichloroethylene	ug/Kg	<20		07/07/1992	njd
Tetrachloroethylene	ug/Kg	<20		07/07/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/13/1992

Job Number: 92.3507

Job Description: Howe Valley

Parameter	Continuing Calibration Verification		
	Standard	Date	Lab
	% Recovery	Analyzed	Tech
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	120	07/07/1992	njd
1,1 Dichloroethylene	96	07/07/1992	njd
Chloroform	92	07/07/1992	njd
1,1,1-Trichloroethane	92	07/07/1992	njd
Trichloroethylene	92	07/07/1992	njd
Tetrachloroethylene	88	07/07/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION

07/13/1992

Job Number: 92.3507

Job Description: Howe Valley

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108896	Chlorobutane	106
108897	Chlorobutane	107
108898	Chlorobutane	97
108899	Chlorobutane	92
108900	Chlorobutane	94
108901	Chlorobutane	97
108902	Chlorobutane	107
108903	Chlorobutane	100

### Advisory Control Limits:

<u>GC/MS</u> (8240/8270)	<u>Matrix</u>		<u>GC</u>
	Water	Other	(8010/8020)
1,2-Dichlorobenzene-d4	76-114%	70-121%	Chlorobutane 80-120%
Toluene-d8	88-110%	81-117%	n-Propylbenzene 80-120%
4-Bromofluorobenzene	86-115%	74-121%	4-Bromofluorobenzene 80-120%
Nitrobenzene-d5	35-114%	23-120%	(8310)
2-Fluorobiphenyl	43-116%	30-115%	2-Fluorobiphenyl 40-140%
Terphenyl-d14	33-141%	18-137%	(8080)
Phenol-d6	10-94%	24-113%	Decachlorobiphenyl 24-150%
2-Fluorophenol	21-100%	25-121%	2,4,5,6-Tetrachloro-m-xylene 24-150%
2,4,6-Tribromophenol	10-123%	19-122%	





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3508  
Sample No.: 108904

Project #1050  
Howe Valley

Sample Description: #9 HV1-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	82.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3508  
Sample No.: 108904

Project #1050  
Howe Valley

Sample Description: #9 HV1-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3508  
Sample No.: 108904

Project #1050  
Howe Valley

Sample Description: #9 HV1-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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## ANALYTICAL REPORT

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07/10/1992

Job No.: 92.3508  
Sample No.: 108905

Project #1050  
Howe Valley

Sample Description: #10 HV2-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	80.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

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THE DRAGUN CORPORATION  
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07/10/1992

Job No.: 92.3508  
Sample No.: 108905

Project #1050  
Howe Valley

Sample Description: #10 HV2-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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07/10/1992

Job No.: 92.3508  
Sample No.: 108905

Project #1050  
Howe Valley

Sample Description: #10 HV2-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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TESTING, INC.

NET Midwest, Inc.  
Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326

Tel: (313) 391-2050  
Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992  
Job No.: 92.3508  
Sample No.: 108906

Project #1050  
Howe Valley

Sample Description: #11 HV3-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	72.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
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Suite 260  
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07/10/1992

Job No.: 92.3508  
Sample No.: 108906

Project #1050  
Howe Valley

Sample Description: #11 HV3-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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30445 Northwestern Highway  
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Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3508  
Sample No.: 108906

Project #1050  
Howe Valley

Sample Description: #11 HV3-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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07/10/1992

Job No.: 92.3508  
Sample No.: 108907

Project #1050  
Howe Valley

Sample Description: #12 HV4-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	72.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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07/10/1992

Job No.: 92.3508  
Sample No.: 108907

Project #1050  
Howe Valley

Sample Description: #12 HV4-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/10/1992

Job No.: 92.3508  
Sample No.: 108907

Project #1050  
Howe Valley

Sample Description: #12 HV4-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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07/10/1992

Job No.: 92.3508  
Sample No.: 108908

Project #1050  
Howe Valley

Sample Description: #13 HV5-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	82.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
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07/10/1992

Job No.: 92.3508  
Sample No.: 108908

Project #1050  
Howe Valley

Sample Description: #13 HV5-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/10/1992

Job No.: 92.3508  
Sample No.: 108908

Project #1050  
Howe Valley

Sample Description: #13 HV5-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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Project Manager





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## ANALYTICAL REPORT

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30445 Northwestern Highway  
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07/10/1992

Job No.: 92.3508  
Sample No.: 108909

Project #1050  
Howe Valley

Sample Description: #14 HV6-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	80.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
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## ANALYTICAL REPORT

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07/10/1992

Job No.: 92.3508  
Sample No.: 108909

Project #1050  
Howe Valley

Sample Description: #14 HV6-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/10/1992

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Sample No.: 108909

Project #1050  
Howe Valley

Sample Description: #14 HV6-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

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Results on a dry weight basis.

Bryce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
**THE DRAGUN CORPORATION**  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3508  
Sample No.: 108910

Project #1050  
Howe Valley

Sample Description: #15 HV7-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	72.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3508  
Sample No.: 108910

Project #1050  
Howe Valley

Sample Description: #15 HV7-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/07/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3508  
Sample No.: 108910

Project #1050  
Howe Valley

Sample Description: #15 HV7-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/07/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/07/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3508  
Sample No.: 108911

Project #1050  
Howe Valley

Sample Description: #16 HV8-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	72.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3508  
Sample No.: 108911

Project #1050  
Howe Valley

Sample Description: #16 HV8-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/08/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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07/10/1992

Job No.: 92.3508  
Sample No.: 108911

Project #1050  
Howe Valley

Sample Description: #16 HV8-12 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## MICHIGAN ACT 307 REPORTING LIMIT UPDATE

In a continued effort to improve our service to you, we feel it is worth mentioning there have been some recent recommended method detection level changes for Michigan Act 307 parameters (Ref. MERA #6, Revision #1 - 4/22/92). Most notably is the increase in the reporting limit in soil for the listed PCB Aroclors from 33. ug/Kg (dry weight basis) to 330. ug/Kg (dry weight basis).

All future analytical reports that request MI Act 307 D.L.'s will reflect these changes. If you have any questions please call your Project Manager or Customer Service Representative.





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92-3508 1A 8904-  
089

Wendy Kuhn 9320228

THE DRAGUN CORPORATION	20445 Northwestern Hwy Suite 2602	Farmington Hills, MI 48334	CHAIN OF CUSTODY RECORD
------------------------	--------------------------------------	-------------------------------	-------------------------

PROJECT NO	SITE NAME				NO OF CON. TAINERS	8010	REMARKS
STATION NO	DATE	TIME	COMP	GRAB			
1	6/21/92	10:55			HV1-11	1	continuation of Horne Valley
2		10:00			HV2-11	1	shdy. # 11's day 16
3		11:35			HV3-11	1	# 12's day 19
4		11:50			HV4-11	1	
5		11:10			HV5-11	1	
6		11:20			HV6-11	1	
7		12:00	N		HV7-11	1	
8		12:15	P		HV8-11	1	
9	6/24/92	9:35			HV1-12	1	
10		9:40			HV2-12	1	
11		10:15			HV3-12	1	
12		10:25			HV4-12	1	
13		9:55			HV5-12	1	

RELINQUISHED BY (SIGNATURE): <i>Wendy Kuhn</i>	DATE/TIME: 6-25 1:00	RECEIVED BY (SIGNATURE): <i>Mark Bangs</i>	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE/TIME:	REMARKS:	

92.3508 100901

Wendy Kuhn 9320228

THE DRAGUN CORPORATION	30445 Northwestern Hwy Suite 260	Farmington Hills, MI 48334	CHAIN OF CUSTODY RECORD
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PROJECT NO		SITE NAME		NO OF CONTAINERS	REMARKS		
SAMPLER'S SIGNATURE	STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION	
Wendy Kuhn	14	6/24/92	10:00 a		1	HVG-12	
	15		10:40 a		1	HVG-12	
	16		10:55 a		1	HVG-12	
	17	6/24/92	2:00 p		1	HVG-1	spiked with 100 ppm (w/w) PCE
	18				1	HVG-2	→
	19				1	HVG-3	spiked with 200 ppm (w/w) PCE
	20				1	HVG-4	→
	21				1	HVG-5	spiked with 200 ppm (w/w) PCE
	22				1	HVG-6	→ #17-20 will be in range of other Howe Valley samples. #21-22 will probably be higher

RELINQUISHED BY (SIGNATURE): <i>Wendy Kuhn</i>	DATE/TIME: 6-25 1:00	RECEIVED BY (SIGNATURE): <i>Bob Berg</i>	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):	DATE/TIME:	REMARKS:	



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07/29/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3508  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE	SAMPLE DESCRIPTION
108904	#9 HV1-12 06/24
108905	#10 HV2-12 06/24
108906	#11 HV3-12 06/24
108907	#12 HV4-12 06/24
108908	#13 HV5-12 06/24
108909	#14 HV6-12 06/24
108910	#15 HV7-12 06/24
108911	#16 HV8-12 06/24

Bruce E. Brown  
Project Manager

Christopher P. Dock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

07/29/1992

Job Number: 92.3508

Job Description: Howe Valley

Sample Number: 108904 - 108910

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
Methylene chloride	ug/Kg	<20	07/07/1992	njd
1,1 Dichloroethylene	ug/Kg	<20	07/07/1992	njd
Chloroform	ug/Kg	<20	07/07/1992	njd
1,1,1-Trichloroethane	ug/Kg	<20	07/07/1992	njd
Trichloroethylene	ug/Kg	<20	07/07/1992	njd
Tetrachloroethylene	ug/Kg	<20	07/07/1992	njd
Benzene	ug/Kg	<20	07/07/1992	njd
Toluene	ug/Kg	<20	07/07/1992	njd
Ethyl Benzene	ug/Kg	<20	07/07/1992	njd
Xylene	ug/Kg	<20	07/07/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

07/29/1992

Job Number: 92.3508

Job Description: Howe Valley

Sample Number: 108911

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
Methylene chloride	ug/Kg	<20	07/07/1992	njd
1,1 Dichloroethylene	ug/Kg	<20	07/07/1992	njd
Chloroform	ug/Kg	<20	07/07/1992	njd
1,1,1-Trichloroethane	ug/Kg	<20	07/07/1992	njd
Trichloroethylene	ug/Kg	<20	07/07/1992	njd
Tetrachloroethylene	ug/Kg	<20	07/07/1992	njd
Benzene	ug/Kg	<20	07/07/1992	njd
Toluene	ug/Kg	<20	07/07/1992	njd
Ethyl Benzene	ug/Kg	<20	07/07/1992	njd
Xylene	ug/Kg	<20	07/07/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/29/1992

Job Number: 92.3508

Job Description: Howe Valley

Sample Number: 108904 - 108910

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech
Methylene chloride	120	07/07/1992	njd
1,1 Dichloroethylene	96	07/07/1992	njd
Chloroform	92	07/07/1992	njd
1,1,1-Trichloroethane	92	07/07/1992	njd
Trichloroethylene	92	07/07/1992	njd
Tetrachloroethylene	88	07/07/1992	njd
Benzene	88	07/07/1992	njd
Toluene	88	07/07/1992	njd
Ethyl Benzene	84	07/07/1992	njd
Xylene	88	07/07/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/29/1992

Job Number: 92.3508

Job Description: Howe Valley

Sample Number: 108911

Continuing  
Calibration  
Verification

Parameter	Standard % Recovery	Date Analyzed	Lab Tech
Methylene chloride	96	07/07/1992	njd
1,1 Dichloroethylene	96	07/07/1992	njd
Chloroform	88	07/07/1992	njd
1,1,1-Trichloroethane	92	07/07/1992	njd
Trichloroethylene	88	07/07/1992	njd
Tetrachloroethylene	92	07/07/1992	njd
Benzene	92	07/07/1992	njd
Toluene	84	07/07/1992	njd
Ethyl Benzene	88	07/07/1992	njd
Xylene	88	07/07/1992	njd

NA - Not Applicable

### Advisory Control Limits:

#### Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

#### Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION

07/29/1992

Job Number: 92.3508

Job Description: Howe Valley

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108904	Chlorobutane	102
108905	Chlorobutane	89
108906	Chlorobutane	91
108907	Chlorobutane	86
108908	Chlorobutane	85
108909	Chlorobutane	95
108910	Chlorobutane	81
108911	Chlorobutane	99

### Advisory Control Limits:

GC/MS	Matrix		Volatile Compounds:	80-120%
	Water	Other		
1,2 Dichlorobenzene-d4	76-114%	70-121%	Chlorobutane	80-120%
Toluene-d8	88-110%	81-117%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	86-115%	74-121%	PNAH Compounds:	40-140%
Nitrobenzene-d5	35-114%	23-120%	2-Fluorobiphenyl	
2-Fluorobiphenyl	43-116%	30-115%	PCBs:	
Terphenyl-d14	33-141%	18-137%	Decachlorobiphenyl	
Phenol-d6	10-94%	24-113%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	21-100%	25-121%		
2,4,6-Tribromophenol	10-123%	19-122%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3661  
Sample No.: 109412

Project #1050  
Howe Valley - Day 23

Sample Description: #1 HV1-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	84.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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Farmington Hills, MI 48334

07/15/1992  
Job No.: 92.3661  
Sample No.: 109412

Project #1050  
Howe Valley - Day 23

Sample Description: #1 HV1-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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07/15/1992

Job No.: 92.3661  
Sample No.: 109412

Project #1050  
Howe Valley - Day 23

Sample Description: #1 HV1-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown KIB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3661  
Sample No.: 109413

Project #1050  
Howe Valley - Day 23

Sample Description: #2 HV2-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	82.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992  
Job No.: 92.3661  
Sample No.: 109413

Project #1050  
Howe Valley - Day 23

Sample Description: #2 HV2-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3661  
Sample No.: 109413

Project #1050  
Howe Valley • Day 23

Sample Description: #2 HV2-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown /KB  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3661  
Sample No.: 109414

Project #1050  
Howe Valley - Day 23

Sample Description: #3 HV3-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	73.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3661  
Sample No.: 109414

Project #1050  
Howe Valley - Day 23

Sample Description: #3 HV3-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3661  
Sample No.: 109414

Project #1050  
Howe Valley - Day 23

Sample Description: #3 HV3-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

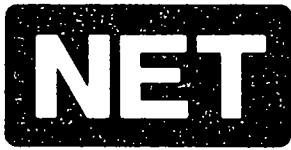
Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /CLB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3661  
Sample No.: 109415

Project #1050  
Howe Valley - Day 23

Sample Description: #4 HV4-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	73.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3661  
Sample No.: 109415

Project #1050  
Howe Valley - Day 23

Sample Description: #4 HV4-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	29.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3661  
Sample No.: 109415

Project #1050  
Howe Valley - Day 23

Sample Description: #4 HV4-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown, Jr.*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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07/15/1992

Job No.: 92.3661  
Sample No.: 109416

Project #1050  
Howe Valley - Day 23

Sample Description: #5 HV5-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	82.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
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07/15/1992

Job No.: 92.3661  
Sample No.: 109416

Project #1050  
Howe Valley - Day 23

Sample Description: #5 HV5-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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07/15/1992

Job No.: 92.3661  
Sample No.: 109416

Project #1050  
Howe Valley - Day 23

Sample Description: #5 HV5-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown KOB*  
Bruce E. Brown  
Project Manager





NATIONAL  
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® TESTING, INC.

Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326  
Tel: (313) 391-2050  
Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3661  
Sample No.: 109417

Project #1050  
Howe Valley - Day 23

Sample Description: #6 HV6-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	81.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3661  
Sample No.: 109417

Project #1050  
Howe Valley - Day 23

Sample Description: #6 HV6-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3661  
Sample No.: 109417

Project #1050  
Howe Valley - Day 23

Sample Description: #6 HV6-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown/CB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3661  
Sample No.: 109418

Project #1050  
Howe Valley - Day 23

Sample Description: #7 HV7-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	73.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3661  
Sample No.: 109418

Project #1050  
Howe Valley - Day 23

Sample Description: #7 HV7-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3661  
Sample No.: 109418

Project #1050  
Howe Valley - Day 23

Sample Description: #7 HV7-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown /C/B  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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07/15/1992

Job No.: 92.3661  
Sample No.: 109419

Project #1050  
Howe Valley - Day 23

Sample Description: #8 HV8-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	73.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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Farmington Hills, MI 48334

07/15/1992  
Job No.: 92.3661  
Sample No.: 109419

Project #1050  
Howe Valley - Day 23

Sample Description: #8 HV8-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992  
Job No.: 92.3661  
Sample No.: 109419

Project #1050  
Howe Valley - Day 23

Sample Description: #8 HV8-13 06/27

Date Taken: 06/27/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown P.E.B.*  
Bruce E. Brown  
Project Manager





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#### METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

#### UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92-36641 10-12-109419

Wendy Kuhn 932-0228

THE DRAGUN CORPORATION

30495 Northwestway Rd Faure, Johnston Ia. 50526  
Suite 260

## CHAIN OF CUSTODY RECORD

PROJECT NO		SITE NAME		NO OF CONTAINERS	REMARKS		
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION		
1	9/27 92	9:55 a		1	HV1-13	1 Day 23	
2		10:00 a		1	HV2-13	cont'd g Study	
3		10:25 a		1	HV3-13		
4		10:30 a		1	HV4-13		
5		10:45 a		1	HV5-13		
6		10:15 a		1	HV6-13		
7		10:40 a		1	HV7-13		
8		10:45 a		1	HV8-13		
9	9/28 92	9:25 a		1	HV1-14	Day 26	
10		9:30 a		1	HV2-14	cont'd g Study	
11		9:55 a		1	HV3-14		
12		10:05 a		1	HV4-14		
13		9:40 a		1	HV5-14		
RELINQUISHED BY (SIGNATURE):		DATE/TIME:	RECEIVED BY (SIGNATURE):		RELINQUISHED BY (SIGNATURE)	DATE/TIME:	RECEIVED BY (SIGNATURE)
<i>Wendy Kuhn</i>		7-2-92 2:10	<i>John York</i>				
RELINQUISHED BY (SIGNATURE):		DATE/TIME:	RECEIVED BY (SIGNATURE):		RELINQUISHED BY (SIGNATURE)	DATE/TIME:	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE):		DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):		DATE/TIME:	REMARKS:	
			<i>Paullyn Farrelleon</i>		7-2-92 15:15		



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07/15/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3661

PROJECT DESCRIPTION: Project #1050

JOB DESCRIPTION: Howe Valley - Day 23

NET SAMPLE

109412  
109413  
109414  
109415  
109416  
109417  
109418  
109419

SAMPLE DESCRIPTION

#1	HV1-13	06/27
#2	HV2-13	06/27
#3	HV3-13	06/27
#4	HV4-13	06/27
#5	HV5-13	06/27
#6	HV6-13	06/27
#7	HV7-13	06/27
#8	HV8-13	06/27

*Bruce E. Brown / CEB*  
Bruce E. Brown  
Project Manager

*C. P. J.*  
Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

07/15/1992

Job Number: 92.3661

Job Description: Howe Valley - Day 23

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>-VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<20	07/09/1992	njd
1,1-Dichloroethylene	ug/Kg	<20	07/09/1992	njd
Chloroform	ug/Kg	<20	07/09/1992	njd
1,1,1-Trichloroethane	ug/Kg	<20	07/09/1992	njd
Trichloroethylene	ug/Kg	<20	07/09/1992	njd
Tetrachloroethylene	ug/Kg	<20	07/09/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/15/1992

Job Number: 92.3661

Job Description: Howe Valley - Day 23

Parameter	Continuing Calibration Verification Standard		
	% Recovery	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	84	07/09/1992	njd
1,1-Dichloroethylene	88	07/09/1992	njd
Chloroform	100	07/09/1992	njd
1,1,1-Trichloroethane	92	07/09/1992	njd
Trichloroethylene	96	07/09/1992	njd
Tetrachloroethylene	104	07/09/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION

07/15/1992

Job Number: 92.3661

Job Description: Howe Valley - Day 23

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
109412	Chlorobutane	117
109413	Chlorobutane	117
109414	Chlorobutane	100
109415	Chlorobutane	96
109416	Chlorobutane	100
109417	Chlorobutane	108
109418	Chlorobutane	96
109419	Chlorobutane	101

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
	Water	Other	Chlorobutane	80-120%
1,2-Dichlorobenzene-d4	76-114%	70-121%	4-Bromofluorobenzene	80-120%
Toluene-d8	88-110%	81-117%	PNAH Compounds:	
4-Bromofluorobenzene	86-115%	74-121%	2-Fluorobiphenyl	40-140%
Nitrobenzene-d5	35-114%	23-120%	PCBs:	
2-Fluorobiphenyl	43-116%	30-115%	Decachlorobiphenyl	
Terphenyl-d14	33-141%	18-137%	2,4,5,6-Tetrachloro-m-xylene	24-150%
Phenol-d6	10-94%	24-113%		
2-Fluorophenol	21-100%	25-121%		
2,4,6-Tribromophenol	10-123%	19-122%		





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*RECEIVED JUL 20 1992*

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3662  
Sample No.: 109420

Project #1050  
Howe Valley - Day 26

Sample Description: #9 HV1-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	83.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/15/1992  
Job No.: 92.3662  
Sample No.: 109420

Project #1050  
Howe Valley - Day 26

Sample Description: #9 HV1-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
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07/15/1992

Job No.: 92.3662  
Sample No.: 109420

Project #1050  
Howe Valley - Day 26

Sample Description: #9 HV1-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown KLB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3662  
Sample No.: 109421

Project #1050  
Howe Valley - Day 26

Sample Description: #10 HV2-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	82.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

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Project Manager





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07/15/1992

Job No.: 92.3662  
Sample No.: 109421

Project #1050  
Howe Valley - Day 26

Sample Description: #10 HV2-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/15/1992

Job No.: 92.3662  
Sample No.: 109421

Project #1050  
Howe Valley - Day 26

Sample Description: #10 HV2-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /CJS*  
Bruce E. Brown  
Project Manager





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07/15/1992

Job No.: 92.3662  
Sample No.: 109422

Project #1050  
Howe Valley - Day 26

Sample Description: #11 HV3-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	73.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/15/1992

Job No.: 92.3662  
Sample No.: 109422

Project #1050  
Howe Valley - Day 26

Sample Description: #11 HV3-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

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Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/15/1992

Job No.: 92.3662  
Sample No.: 109422

Project #1050  
Howe Valley - Day 26

Sample Description: #11 HV3-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /CJS*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3662  
Sample No.: 109423

Project #1050  
Howe Valley - Day 26

Sample Description: #12 HV4-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	74.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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30445 Northwestern Highway  
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07/15/1992

Job No.: 92.3662  
Sample No.: 109423

Project #1050  
Howe Valley - Day 26

Sample Description: #12 HV4-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	65.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/15/1992

Job No.: 92.3662  
Sample No.: 109423

Project #1050  
Howe Valley - Day 26

Sample Description: #12 HV4-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /KLB*  
Bruce E. Brown  
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## ANALYTICAL REPORT

Wendy Kuhn  
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07/15/1992

Job No.: 92.3662  
Sample No.: 109424

Project #1050  
Howe Valley - Day 26

Sample Description: #13 HV5-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	83.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3662  
Sample No.: 109424

Project #1050  
Howe Valley - Day 26

Sample Description: #13 HV5-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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1700 Harmon Road  
Auburn Hills, MI 48326  
Tel: (313) 391-2050  
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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3662  
Sample No.: 109424

Project #1050  
Howe Valley - Day 26

Sample Description: #13 HV5-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown /CB  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3662  
Sample No.: 109425

Project #1050  
Howe Valley - Day 26

Sample Description: #14 HV6-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	83.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3662  
Sample No.: 109425

Project #1050  
Howe Valley - Day 26

Sample Description: #14 HV6-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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07/15/1992

Job No.: 92.3662  
Sample No.: 109425

Project #1050  
Howe Valley - Day 26

Sample Description: #14 HV6-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown / CJS*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
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07/15/1992

Job No.: 92.3662  
Sample No.: 109426

Project #1050  
Howe Valley - Day 26

Sample Description: #15 HV7-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	73.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3662  
Sample No.: 109426

Project #1050  
Howe Valley - Day 26

Sample Description: #15 HV7-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/15/1992

Job No.: 92.3662  
Sample No.: 109426

Project #1050  
Howe Valley - Day 26

Sample Description: #15 HV7-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E Brown Jr.*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/15/1992

Job No.: 92.3662  
Sample No.: 109427

Project #1050  
Howe Valley - Day 26

Sample Description: #16 HV8-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	73.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
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07/15/1992

Job No.: 92.3662  
Sample No.: 109427

Project #1050  
Howe Valley - Day 26

Sample Description: #16 HV8-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/15/1992

Job No.: 92.3662  
Sample No.: 109427

Project #1050  
Howe Valley - Day 26

Sample Description: #16 HV8-14 06/30

Date Taken: 06/30/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown*  
Bruce E. Brown  
Project Manager





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#### METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

#### UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92-3662 10 2-109427

Wendy Kuhn 932-0228

THE DRAGUN CORPORATION	30445 Northwestern Hwy Suite 260	Dearborn, MI 48126	CHAIN OF CUSTODY RECORD
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PROJECT NO		SITE NAME		NO OF CONTAINERS	REMARKS		
1050		Hove Valley					
SAMPLER'S SIGNATURE:							
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION		
1	4/21 9:12	9:55 a		1	HV1-13	1 1 Day 23	
2	1	10:00 a			HV2-13	1 cont'd of Study	
3		10:25 a			HV3-13	1	
4		10:30 a			HV4-13	1	
5		10:45 a			HV5-13	1	
6		10:15 a			HV6-13	1	
7		10:40 a			HV7-13	1	
8		10:45 a		1	HV8-13	1	
9	4/21 9:11	9:25 a		1	HV9-14	1 Day 26	
10	1	9:30 a		1	HV10-14	1 cont'd of Study	
11		9:55 a		1	HV11-14	1	
12		10:05 a		1	HV12-14	1	
13		9:40 a		1	HV13-14	1	
RELINQUISHED BY (SIGNATURE):		DATE/TIME:	RECEIVED BY (SIGNATURE):		RELINQUISHED BY (SIGNATURE)	DATE/TIME:	RECEIVED BY (SIGNATURE)
<i>Wendy Kuhn</i>		7-2-92 2:10	<i>John H.</i>				
RELINQUISHED BY (SIGNATURE):		DATE/TIME:	RECEIVED BY (SIGNATURE):		RELINQUISHED BY (SIGNATURE)	DATE/TIME:	RECEIVED BY (SIGNATURE)
		7/2/92	<i>Rosemary O. Valenzano</i>				
RELINQUISHED BY (SIGNATURE):		DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE):		DATE/TIME:	REMARKS:	



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07/15/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3662

PROJECT DESCRIPTION: Project #1050

JOB DESCRIPTION: Howe Valley - Day 26

NET SAMPLE

109420  
109421  
109422  
109423  
109424  
109425  
109426  
109427

SAMPLE DESCRIPTION

#9	HV1-14	06/30
#10	HV2-14	06/30
#11	HV3-14	06/30
#12	HV4-14	06/30
#13	HV5-14	06/30
#14	HV6-14	06/30
#15	HV7-14	06/30
#16	HV8-14	06/30

*Bruce E. Brown CES*  
Bruce E. Brown  
Project Manager

*Christopher P. Jock*  
Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

07/15/1992

Job Number: 92.3662

Job Description: Howe Valley - Day 26

Sample Number: 109420

Parameter	Units	Procedure	Date Analyzed	Lab Tech
		Blank Observed Value		
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<20	07/09/1992	njd
1,1-Dichloroethylene	ug/Kg	<20	07/09/1992	njd
Chloroform	ug/Kg	<20	07/09/1992	njd
1,1,1-Trichloroethane	ug/Kg	<20	07/09/1992	njd
Trichloroethylene	ug/Kg	<20	07/09/1992	njd
Tetrachloroethylene	ug/Kg	<20	07/09/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

07/15/1992

Job Number: 92.3662

Job Description: Howe Valley - Day 26

Sample Number: 109421 - 109427

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<20	07/09/1992	njd
1,1-Dichloroethylene	ug/Kg	<20	07/09/1992	njd
Chloroform	ug/Kg	<20	07/09/1992	njd
1,1,1-Trichloroethane	ug/Kg	<20	07/09/1992	njd
Trichloroethylene	ug/Kg	<20	07/09/1992	njd
Tetrachloroethylene	ug/Kg	<20	07/09/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/15/1992

Job Number: 92.3662

Job Description: Howe Valley - Day 26

Sample Number: 109420

Parameter	Continuing Calibration Verification Standard % Recovery	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	84	07/10/1992	njd
1,1-Dichloroethylene	88	07/10/1992	njd
Chloroform	100	07/10/1992	njd
1,1,1-Trichloroethane	92	07/10/1992	njd
Trichloroethylene	96	07/10/1992	njd
Tetrachloroethylene	104	07/10/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/15/1992

Job Number: 92.3662

Job Description: Howe Valley - Day 26

Sample Number: 109421 - 109427

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	96	07/10/1992	njd
1,1,-Dichloroethylene	92	07/10/1992	njd
Chloroform	104	07/10/1992	njd
1,1,1-Trichloroethane	96	07/10/1992	njd
Trichloroethylene	100	07/10/1992	njd
Tetrachloroethylene	104	07/10/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION

07/15/1992

Job Number: 92.3662

Job Description: Howe Valley - Day 26

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
109420	Chlorobutane	105
109421	Chlorobutane	119
109422	Chlorobutane	117
109423	Chlorobutane	109
109424	Chlorobutane	116
109425	Chlorobutane	101
109426	Chlorobutane	107
109427	Chlorobutane	107

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>	<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	Water Other	Chlorobutane	80-120%
Toluene-d8	76-114% 88-110%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	86-115%	PNAH Compounds:	
Nitrobenzene-d5	35-114%	2-Fluorobiphenyl	40-140%
2-Fluorobiphenyl	43-116%	PCBs:	
Terphenyl-d14	33-141%	Decachlorobiphenyl	
Phenol-d6	10-94%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	21-100%		
2,4,6-Tribromophenol	10-123%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/20/1992

Job No.: 92.3664  
Sample No.: 109432

Project #1050  
Howe Valley - Day 28

Sample Description: #17 HV1-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	84.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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07/20/1992

Job No.: 92.3664  
Sample No.: 109432

Project #1050  
Howe Valley - Day 28

Sample Description: #17 HV1-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992  
Job No.: 92.3664  
Sample No.: 109432

Project #1050  
Howe Valley - Day 28

Sample Description: #17 HV1-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /CB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109433

Project #1050  
Howe Valley - Day 28

Sample Description: #18 HV2-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	83.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/20/1992

Job No.: 92.3664  
Sample No.: 109433

Project #1050  
Howe Valley - Day 28

Sample Description: #18 HV2-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
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07/20/1992

Job No.: 92.3664  
Sample No.: 109433

Project #1050  
Howe Valley - Day 28

Sample Description: #18 HV2-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /CDB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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07/20/1992

Job No.: 92.3664  
Sample No.: 109434

Project #1050  
Howe Valley - Day 28

Sample Description: #19 HV3-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	73.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
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07/20/1992

Job No.: 92.3664  
Sample No.: 109434

Project #1050  
Howe Valley - Day 28

Sample Description: #19 HV3-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/13/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109434

Project #1050  
Howe Valley - Day 28

Sample Description: #19 HV3-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /C/B*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/20/1992

Job No.: 92.3664  
Sample No.: 109435

Project #1050  
Howe Valley - Day 28

Sample Description: #20 HV4-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	73.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/20/1992

Job No.: 92.3664  
Sample No.: 109435

Project #1050  
Howe Valley - Day 28

Sample Description: #20 HV4-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
VOLATILE COMPOUNDS					
Bromodichloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/10/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
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07/20/1992

Job No.: 92.3664  
Sample No.: 109435

Project #1050  
Howe Valley - Day 28

Sample Description: #20 HV4-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/10/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/10/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown /CJB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109436

Project #1050  
Howe Valley - Day 28

Sample Description: #21 HV5-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	84.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109436

Project #1050  
Howe Valley - Day 28

Sample Description: #21 HV5-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/13/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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30445 Northwestern Highway  
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07/20/1992

Job No.: 92.3664  
Sample No.: 109436

Project #1050  
Howe Valley - Day 28

Sample Description: #21 HV5-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown / CLB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109437

Project #1050  
Howe Valley - Day 28

Sample Description: #22 HV6-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	83.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109437

Project #1050  
Howe Valley - Day 28

Sample Description: #22 HV6-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/13/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109437

Project #1050  
Howe Valley - Day 28

Sample Description: #22 HV6-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown, P.E.*  
Bruce E. Brown  
Project Manager





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## **ANALYTICAL REPORT**

Wendy Kuhn  
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30445 Northwestern Highway  
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07/20/1992

Job No.: 92.3664  
Sample No.: 109438

Project #1050  
Howe Valley - Day 28

Sample Description: #23 HV7-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	74.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109438

Project #1050  
Howe Valley - Day 28

Sample Description: #23 HV7-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/13/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109438

Project #1050  
Howe Valley - Day 28

Sample Description: #23 HV7-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E Brown /CIB*  
Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/20/1992

Job No.: 92.3664  
Sample No.: 109439

Project #1050  
Howe Valley - Day 28

Sample Description: #24 HV8-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	74.	%	07/13/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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30445 Northwestern Highway  
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07/20/1992

Job No.: 92.3664  
Sample No.: 109439

Project #1050  
Howe Valley - Day 28

Sample Description: #24 HV8-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/13/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Tetrachloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/20/1992

Job No.: 92.3664  
Sample No.: 109439

Project #1050  
Howe Valley - Day 28

Sample Description: #24 HV8-15 07/02

Date Taken: 07/02/1992

Date Received: 07/02/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/13/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/13/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6 Revision No. 1: Analytical Detection Level Guidance for Environmental Contamination Response Activities, April 22, 1992.

Results on a dry weight basis.

*Bruce E. Brown / CLB*  
Bruce E. Brown  
Project Manager





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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92-3664

109432 - 109439

Wendy Kuhn 932-0228

THE DRAGUN CORPORATION

30445 Northwestern Hwy  
Suite 260Farmington Hills,  
MI 48334

CHAIN OF CUSTODY RECORD

PROJECT NO		SITE NAME			NO OF CONTAINERS	REMARKS		
1050		Hove Valley						
SAMPLERS (SIGNATURE)								
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION			
14	6/30/92	9:40	a	1	HV6-14	1		
15		9:45	a	1	HV7-14	1		
16		10:25	a	1	HV8-14	1		
17	7/1/92	10:05	a	1	HV1-15	1		
18		10:10	a	1	HV2-15		Day 28	
19		10:35	a	1	HV3-15		cont of study	
20		10:45		1	HV4-15			
21		10:15	a	1	HV5-15			
22		10:30	a	1	HV6-15			
23		11:00	a	1	HV7-15			
24		11:10	a	1	HV8-15	1		
RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)			RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
<u>Wendy Kuhn</u>		7-2-92 2:10	<u>John M.</u>					
RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED BY (SIGNATURE)			RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)		DATE/TIME	RECEIVED FOR LABORATORY BY (SIGNATURE)			DATE/TIME	REMARKS	
			<u>Analyst: Aslecan</u>			7/2/92 15:15 PM		



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07/20/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
3045 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3664

PROJECT DESCRIPTION: Project #1050

JOB DESCRIPTION: Howe Valley - Day 28

NET SAMPLE

109432  
109433  
109434  
109435  
109436  
109437  
109438  
109439

SAMPLE DESCRIPTION

#17 HV1-15 07/02  
#18 HV2-15 07/02  
#19 HV3-15 07/02  
#20 HV4-15 07/02  
#21 HV5-15 07/02  
#22 HV6-15 07/02  
#23 HV7-15 07/02  
#24 HV8-15 07/02

*Bruce E. Brown / CEB*  
Bruce E. Brown  
Project Manager

*Christopher P. Jock / ps*  
Christopher P. Jock  
Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

07/20/1992

Job Number: 92.3664

Job Description: Howe Valley - Day 28

Sample Number: 109432; 109433; 109435

Parameter	Units	Procedure		
		Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<20	07/10/1992	njd
1,1 Dichloroethylene	ug/Kg	<20	07/10/1992	njd
Chloroform	ug/kg	<20	07/10/1992	njd
1,1,1-Trichloroethane	ug/kg	<20	07/10/1992	njd
Trichloroethylene	ug/Kg	<20	07/10/1992	njd
Tetrachloroethylene	ug/Kg	<20	07/10/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION

07/20/1992

Job Number: 92.3664

Job Description: Howe Valley - Day 28

Sample Number: 109434; 109436 - 109439

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>				
Methylene chloride	ug/Kg	<20	07/11/1992	njd
1,1 Dichloroethylene	ug/Kg	<20	07/11/1992	njd
Chloroform	ug/kg	<20	07/11/1992	njd
1,1,1-Trichloroethane	ug/kg	<20	07/11/1992	njd
Trichloroethylene	ug/Kg	<20	07/11/1992	njd
Tetrachloroethylene	ug/Kg	<20	07/11/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/20/1992

Job Number: 92.3664

Job Description: Howe Valley - Day 28

Sample Number: 109432; 109433 - 109435

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech

### VOLATILE COMPOUNDS

Methylene chloride	96	07/10/1992	njd
1,1 Dichloroethylene	92	07/10/1992	njd
Chloroform	104	07/10/1992	njd
1,1,1-Trichloroethane	96	07/10/1996	njd
Trichloroethylene	100	07/10/1992	njd
Tetrachloroethylene	104	07/10/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/20/1992

Job Number: 92-3664

Job Description: Howe Valley - Day 28

Sample Number: 109434; 109436 - 109439

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech
<b>VOLATILE COMPOUNDS</b>			
Methylene chloride	84	07/11/1992	njd
1,1 Dichloroethylene	84	07/11/1992	njd
Chloroform	96	07/11/1992	njd
1,1,1-Trichloroethane	88	07/11/1996	njd
Trichloroethylene	96	07/11/1992	njd
Tetrachloroethylene	92	07/11/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION

07/20/1992

Job Number: 92.3664

Job Description: Howe Valley - Day 28

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
109432	Chlorobutane	95
109433	Chlorobutane	96
109434	Chlorobutane	99
109435	Chlorobutane	98
109436	Chlorobutane	94
109437	Chlorobutane	108
109438	Chlorobutane	87
109439	Chlorobutane	97

### Advisory Control Limits:

<u>GC/MS</u>	<u>Matrix</u>		<u>Volatile Compounds:</u>	
1,2 Dichlorobenzene-d4	Water	Other	Chlorobutane	80-120%
Toluene-d8	76-114%	70-121%	4-Bromofluorobenzene	80-120%
4-Bromofluorobenzene	88-110%	81-117%	PNAH Compounds:	
Nitrobenzene-d5	86-115%	74-121%	2-Fluorobiphenyl	40-140%
2-Fluorobiphenyl	35-114%	23-120%	PCBs:	
Terphenyl-d14	43-116%	30-115%	Decachlorobiphenyl	
Phenol-d6	33-141%	18-137%	2,4,5,6-Tetrachloro-m-xylene	24-150%
2-Fluorophenol	10-94%	24-113%		
2,4,6-Tribromophenol	21-100%	25-121%		
	10-123%	19-122%		





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3509  
Sample No.: 108912

Project #1050  
Howe Valley

Sample Description: #17 HV9-1 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	77.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3509  
Sample No.: 108912

Project #1050  
Howe Valley

Sample Description: #17 HV9-1 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/08/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Tetrachloroethene	27.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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07/10/1992

Job No.: 92.3509  
Sample No.: 108912

Project #1050  
Howe Valley

Sample Description: #17 HV9-1 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
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Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3509  
Sample No.: 108913

Project #1050  
Howe Valley

Sample Description: #18 HV9-2 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	80.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3509  
Sample No.: 108913

Project #1050  
Howe Valley

Sample Description: #18 HV9-2 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Bromoform	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Tetrachloroethene	59.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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## ANALYTICAL REPORT

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30445 Northwestern Highway  
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07/10/1992

Job No.: 92.3509  
Sample No.: 108913

Project #1050  
Howe Valley

Sample Description: #18 HV9-2 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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Project Manager





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## ANALYTICAL REPORT

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THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3509  
Sample No.: 108914

Project #1050  
Howe Valley

Sample Description: #19 HV9-3 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

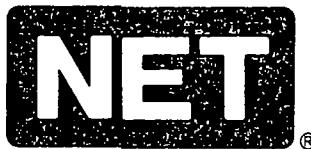
Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	78.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





NATIONAL  
ENVIRONMENTAL  
TESTING, INC.

NET Midwest, Inc.  
Auburn Hills Division  
1700 Harmon Road  
Auburn Hills, MI 48326

Tel: (313) 391-2050  
Fax: (313) 391-9698

## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3509  
Sample No.: 108914

Project #1050  
Howe Valley

Sample Description: #19 HV9-3 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/08/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Tetrachloroethene	62.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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07/10/1992

Job No.: 92.3509  
Sample No.: 108914

Project #1050  
Howe Valley

Sample Description: #19 HV9-3 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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## ANALYTICAL REPORT

Wendy Kuhn  
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30445 Northwestern Highway  
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Farmington Hills, MI 48334

07/10/1992

Job No.: 92.3509  
Sample No.: 108915

Project #1050  
Howe Valley

Sample Description: #20 HV9-4 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	79.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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Project Manager





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## ANALYTICAL REPORT

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07/10/1992

Job No.: 92.3509  
Sample No.: 108915

Project #1050  
Howe Valley

Sample Description: #20 HV9-4 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/08/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Tetrachloroethene	130.	ug/Kg	07/08/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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Project Manager





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07/10/1992

Job No.: 92.3509  
Sample No.: 108915

Project #1050  
Howe Valley

Sample Description: #20 HV9-4 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/08/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/08/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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## ANALYTICAL REPORT

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30445 Northwestern Highway  
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07/10/1992

Job No.: 92.3509  
Sample No.: 108916

Project #1050  
Howe Valley

Sample Description: #21 HV9-5 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	77.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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## ANALYTICAL REPORT

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07/10/1992

Job No.: 92.3509  
Sample No.: 108916

Project #1050  
Howe Valley

Sample Description: #21 HV9-5 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<12.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	6900.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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Project #1050  
Howe Valley

Sample Description: #21 HV9-5 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

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## ANALYTICAL REPORT

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
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07/10/1992

Job No.: 92.3509  
Sample No.: 108917

Project #1050  
Howe Valley

Sample Description: #22 HV9-6 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
Solids, Total	76.	%	07/02/1992	cms	160.3 (3)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

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Project Manager





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## ANALYTICAL REPORT

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07/10/1992

Job No.: 92.3509  
Sample No.: 108917

Project #1050  
Howe Valley

Sample Description: #22 HV9-6 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
<b>VOLATILE COMPOUNDS</b>					
Bromodichloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Bromoform	<40.	ug/Kg	07/09/1992	njd	8010 (1)
Bromomethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Carbon tetrachloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
2-Chloroethyl vinyl ether	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloroform	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Chloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dibromochloromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,3-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,4-Dichlorobenzene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Dichlorodifluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,2-Dichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,2-Dichloropropane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
cis-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
trans-1,3-Dichloropropene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Methylene chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,2,2-Tetrachloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Tetrachloroethene	9700.	ug/Kg	07/09/1992	njd	8010 (1)
1,1,1-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

Results on a dry weight basis.

Bruce E. Brown  
Project Manager





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Sample No.: 108917

Project #1050  
Howe Valley

Sample Description: #22 HV9-6 06/24

Date Taken: 06/24/1992

Date Received: 06/25/1992

Parameter	Result	Unit	Date Analyzed	Lab Tech.	Methodology
1,1,2-Trichloroethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichloroethene	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Trichlorofluoromethane	<20.	ug/Kg	07/09/1992	njd	8010 (1)
Vinyl chloride	<20.	ug/Kg	07/09/1992	njd	8010 (1)

Analytical protocol complies with Michigan Act 307 MERA Operational Memorandum No. 6: Analytical Detection Level Guidance for Environmental Contamination Response Activities, October 1, 1991.

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## METHODOLOGY

- (1) EPA SW846, "Test Methods for Evaluating Solid Wastes".
- (2) ASTM, "American Society for Testing Materials".
- (3) EPA 600/4-79-020, "Methods for Chemical Analysis of Water and Wastes".
- (4) "Standard Methods for the Examination of Water and Wastewater", 17th Edition, 1989.
- (5) 40 CFR, Part 136; reprinted in EPA 600/4-82-057, "Methods for Organic Analyses of Municipal and Industrial Wastewaters."
- (6) 40 CFR, Part 763;
- (7) "Standard Methods for the Examination of Water and Wastewater", 16th Edition, 1985.
- (8) Methods of Air Sampling and Analysis, 2nd. Edition.
- (9) DNR, "Michigan Department of Natural Resources Laboratory Manual for Wastewater Treatment Plant Operators".

## UNITS OF CONVERSION

ppm (part per million) = mg/Kg, mg/L, ug/g, ug/ml

ppb (part per billion) = ug/Kg, ug/L

% = ppm divided by 10,000



92.3509 108912 - 108

Wendy Kuhn 9320228

THE DRAGUN CORPORATION 30445 Northwestern Hwy Farmington Hills, MI  
Suite 260 48334 CHAIN OF CUSTODY RECORD

PROJECT NO		SITE NAME		NO OF CONTAINERS	REMARKS
SAMPLERS (SIGNATURE)					
STATION NO	DATE	TIME	COMP	GRAB	STATION LOCATION
14	6/24/92	10:00 a		1	HVG-12
15	1	10:40 a		1	HVG-12
16	1	10:55 a		1	HVG-12
17	6/24/92	2:00 p		1	HVG-1
18				1	HVG-2
19				1	HVG-3
20				1	HVG-4
21				1	HVG-5
22				1	HVG-6
					spiked with 100 ppm (w/w) PCE
					→
					spiked with 200 ppm (w/w) PCE
					→
					spiked with 200 ppm (w/w) PCE
					→ #17-20 will be in range of other
					Hove Valley samples.
					→ 21-22 will probably be higher

RELINQUISHED BY (SIGNATURE): <i>Wendy Kuhn</i>	DATE/TIME: 6/25 1:00	RECEIVED BY (SIGNATURE): <i>Bob Berg</i>	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):	RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED BY (SIGNATURE):
RELINQUISHED BY (SIGNATURE):	DATE/TIME:	RECEIVED FOR LABORATORY BY (SIGNATURE): <i>Wendy Kuhn</i>	DATE/TIME:	REMARKS:	



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07/29/1992

Wendy Kuhn  
THE DRAGUN CORPORATION  
30445 Northwestern Highway  
Suite 260  
Farmington Hills, MI 48334

Enclosed please find the Quality Control Report for your samples identified below:

JOB NUMBER: 92.3509  
PROJECT DESCRIPTION: Project #1050  
JOB DESCRIPTION: Howe Valley

NET SAMPLE	SAMPLE DESCRIPTION
108912	#17 HV9-1 06/24
108913	#18 HV9-2 06/24
108914	#19 HV9-3 06/24
108915	#20 HV9-4 06/24
108916	#21 HV9-5 06/24
108917	#22 HV9-6 06/24

*Bruce E. Brown*

Bruce E. Brown

Project Manager

*Christopher P. Jock*

Christopher P. Jock

Division Manager





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3509

07/29/1992

Job Description: Howe Valley  
Sample Number: 108912 - 108915

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
Methylene chloride	ug/Kg	<20	07/09/1992	njd
1,1 Dichloroethylene	ug/Kg	<20	07/09/1992	njd
Chloroform	ug/Kg	<20	07/09/1992	njd
1,1,1-Trichloroethane	ug/kg	<20	07/09/1992	njd
Trichloroethylene	ug/Kg	<20	07/09/1992	njd
Tetrachloroethylene	ug/Kg	<20	07/09/1992	njd
Benzene	ug/kg	<20	07/09/1992	njd
Toluene	ug/Kg	<20	07/09/1992	njd
Ethyl Benzene	ug/Kg	<20	07/09/1992	njd
Xylene	ug/Kg	<20	07/09/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## PROCEDURE BLANK REPORT

Client: THE DRAGUN CORPORATION  
Job Number: 92.3509

07/29/1992

Job Description: Howe Valley  
Sample Number: 108916 - 108917

Parameter	Units	Procedure Blank Observed Value	Date Analyzed	Lab Tech
Methylene chloride	ug/Kg	<20	07/09/1992	njd
1,1 Dichloroethylene	ug/Kg	<20	07/09/1992	njd
Chloroform	ug/Kg	<20	07/09/1992	njd
1,1,1-Trichloroethane	ug/kg	<20	07/09/1992	njd
Trichloroethylene	ug/Kg	<20	07/09/1992	njd
Tetrachloroethylene	ug/Kg	<20	07/09/1992	njd
Benzene	ug/kg	<20	07/09/1992	njd
Toluene	ug/Kg	<20	07/09/1992	njd
Ethyl Benzene	ug/Kg	<20	07/09/1992	njd
Xylene	ug/Kg	<20	07/09/1992	njd

NA - Not Applicable

Advisory Control Limits:

Procedure Blank - should be less than the reporting limit





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/29/1992

Job Number: 92.3509

Job Description: Howe Valley

Sample Number: 108912 - 108915

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech
Methylene chloride	96	07/09/1992	njd
1,1 Dichloroethylene	96	07/09/1992	njd
Chloroform	88	07/09/1992	njd
1,1,1-Trichloroethane	92	07/09/1992	njd
Trichloroethylene	88	07/09/1992	njd
Tetrachloroethylene	92	07/09/1992	njd
Benzene	92	07/09/1992	njd
Toluene	84	07/09/1992	njd
Ethyl Benzene	88	07/09/1992	njd
Xylene	88	07/09/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganic:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## CONTINUING CALIBRATION VERIFICATION STANDARD REPORT

Client: THE DRAGUN CORPORATION

07/29/1992

Job Number: 92.3509

Job Description: Howe Valley

Sample Number: 108916 - 108917

Parameter	Continuing Calibration Verification		
	Standard % Recovery	Date Analyzed	Lab Tech
Methylene chloride	84	07/09/1992	njd
1,1 Dichloroethylene	88	07/09/1992	njd
Chloroform	100	07/09/1992	njd
1,1,1-Trichloroethane	92	07/09/1992	njd
Trichloroethylene	96	07/09/1992	njd
Tetrachloroethylene	104	07/09/1992	njd
Benzene	96	07/09/1992	njd
Toluene	92	07/09/1992	njd
Ethyl Benzene	88	07/09/1992	njd
Xylene	92	07/09/1992	njd

NA - Not Applicable

Advisory Control Limits:

Inorganics:

Metals: 90 - 110%

Wet Chemistry: 90 - 110%

Organic:

GC/MS: 80 - 120%

GC: 80 - 120%





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## ORGANIC SURROGATE REPORT

Client: THE DRAGUN CORPORATION

07/29/1992

Job Number: 92.3509

Job Description: Howe Valley

A surrogate standard was spiked into all samples submitted for analysis. The following table lists the recovery values of the surrogate with the associated laboratory acceptance criteria.

Sample Number	Compound Surrogate	Surrogate % Recovery
108912	Chlorobutane	100
108913	Chlorobutane	98
108914	Chlorobutane	106
108915	Chlorobutane	94
108916	Chlorobutane	98
108917	Chlorobutane	90

### Advisory Control Limits:

GC/MS	Matrix		Volatile Compounds:	
	Water	Other	Chlorobutane	80-120%
1,2 Dichlorobenzene-d4	76-114%	70-121%	4-Bromofluorobenzene	80-120%
Toluene-d8	88-110%	81-117%	PNAH Compounds:	
4-Bromofluorobenzene	86-115%	74-121%	2-Fluorobiphenyl	40-140%
Nitrobenzene-d5	35-114%	23-120%	PCBs:	
2-Fluorobiphenyl	43-116%	30-115%	Decachlorobiphenyl	
Terphenyl-d14	33-141%	18-137%	2,4,5,6-Tetrachloro-m-xylene	24-150%
Phenol-d6	10-94%	24-113%		
2-Fluorophenol	21-100%	25-121%		
2,4,6-Tribromophenol	10-123%	19-122%		



**APPENDIX F**  
**QUALITY ASSURANCE/QUALITY CONTROL PLAN**  
**HOWE VALLEY SITE**

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## **1.0 QUALITY ASSURANCE OBJECTIVES**

The following sections describe the quality assurance/quality control (QA/QC) plan for bench-scale testing of VOC volatilization in Howe Valley soil.

The general quality assurance objective is to ensure that environmental data of known and acceptable quality are provided. Data of acceptable quality are precise, accurate, representative, and consistent.

Environmental data collection efforts will adhere to the QA/QC procedures developed by The Dragun Corporation for the collection and preservation of environmental samples and by the analytical laboratory for their analyses.

Precision is a measure of the reproducibility of the data. The precision of analytical project measurements will be evaluated and reported along with the method reference number. Precision will follow Contract Laboratory Program (CLP) criteria. Any deviations from the CLP criteria will be reported in the final report.

Accuracy is the relationship of the reported data to the "true" value. This relationship will be reported with the data and be consistent with any previously published accuracy data from the applicable literature, and federal and state regulations and guidelines. Accuracy will follow CLP criteria. Any deviations from the CLP criteria will be reported in the final report.

All data should be representative of the actual conditions at the sampling location. Considerations in evaluating the data include the location being sampled, the methods utilized to obtain the sample, and the appropriateness of the analytical method to the type of sample obtained.

Completeness is defined as the total amount of acceptable measurements divided by the total number of measurements. At this time, completeness criteria is not specified by the analytical laboratory's (NET Midwest, Inc.) standard operating procedures. However, validation processes are included for the analytical methods to be used in this study.

## **2.0 SAMPLE CUSTODY**

Sample custody procedures are designed to comply with U.S. EPA requirements for sample control. Stringent chain-of-custody procedures will be followed to maintain and document sample possession.

## 2.1 Chain-of-custody

The laboratory personnel are personally responsible for the care and custody of the samples until they are hand-delivered to the contracted analytical laboratory or entrusted to a carrier. All data and records will be maintained in a manner consistent with U.S. EPA Good Laboratory Practices (GLP).

Chain-of-custody forms will be completed prior to sample shipment. They will include the following information:

- Site location or name for identification
- Sample date
- Sample time
- Sample number
- Source of sample
- Analyses to be performed
- Name of sampler
- Signature of sender
- Method of transport to laboratory (i.e., courier name)
- Air bill number, if applicable

These forms will be filled out in a legible manner. Sample identification information will be provided on the sample label which is securely attached to the sample bottle, and a custody seal will be placed on each sample container.

## 2.2 Transfer of Custody and Shipment

The following procedures will be used when transferring custody of samples:

1. Samples will be accompanied by a chain-of-custody form. When transferring samples, the individuals relinquishing and receiving them will sign, date, and note the time on the record.
2. Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis with a separate custody record accompanying each shipment. Shipping containers will be sealed for shipment to the laboratory. The method of shipment, courier name, and other pertinent information will be entered in the remarks section of the custody record.

3. Each shipment will be accompanied by a chain-of-custody form identifying its contents. The white copy is kept by the contracted lab. The pink and yellow copy will remain with laboratory personnel.
4. Proper documentation will be maintained for shipments by common carrier.

#### 2.3 Sample Shipment Procedures

The following procedures will be followed when shipping samples for laboratory analysis:

1. Samples requiring refrigeration will be promptly chilled with ice or "Blue Ice" to a temperature of approximately 40 degrees Fahrenheit and packaged in an insulated cooler for transport to the laboratory.
2. The shipping containers will be sealed with tape and a custody seal will be placed on the shipping containers.
3. Shipment will be via hand-delivery.

#### 2.4 Laboratory Documentation Responsibilities

It will be the responsibility of the laboratory manager to secure all documents produced in the laboratory (i.e., daily logs, data, communications, etc.). The possession of all records will be documented.

### **3.0 CALIBRATION PROCEDURES**

All laboratory equipment used during this project will be calibrated and operated in accordance with the manufacturer's instruction and manuals. Documentation of calibrations will be maintained in the project file.

Calibration procedures for laboratory instruments to be used are included in the laboratory's files.

## 4.0 ANALYTICAL PROCEDURES

Soil samples collected during the course of this field investigation will be analyzed for VOC content using CLP required methods for each analyte in each matrix. The analytical procedures selected for this investigation are gas chromatography, Method 8010, and gas chromatography/mass spectroscopy (GC/MS), Method 8260. Precision and accuracy parameters for Methods 8010 and 8260 are listed in Table F-1.

### 4.1 Method 8010

The validation process starts with an initial check on the calibration curve. If the Initial Calibration Verification Standard is within acceptable limits, a blank containing the surrogate and Continuing Calibration Verification Standard (CCVS) is analyzed. If the blank is clean and the surrogate and CCVS recoveries are within acceptable limits, samples can be analyzed. If the blank is not clean and the surrogate and CCVS recoveries are not within acceptable limits, instrument maintenance must be done and the instrument must be recalibrated.

A blank and CCVS are analyzed every ten samples. If these are not within acceptable limits, they must be reanalyzed along with the previous samples. A Matrix Spike/Matrix Spike Duplicate (MS/MSD) is analyzed every 20 samples (i.e., one per batch). If the CCVS is within acceptable limits, the batch is released regardless of the MS/MSD recoveries.

The sample validation process begins with a review of the surrogate result. If the surrogate recovery is within acceptable limits, the sample result is released. If the surrogate recovery is not within acceptable limits, the sample is reanalyzed.

### 4.2 Method 8260

The validation process starts with tuning of the GC/MS. If the tune is within acceptable limits, then a CCVS is analyzed. If the CCVS is within acceptable limits, the instrument is considered to be ready for samples. If either the tune or CCVS is not within acceptable limits, instrument maintenance must be done.

The analytical batch is validated by the MS/MSD and Laboratory Control Standard (LCS). If one of the MS/MSD compounds is not within the acceptable limits, then the LCS data is reviewed. If the LCS data is within acceptable limits, the batch is released regardless of the MS/MSD results. If the LCS is not within acceptable limits, the batch is reanalyzed.

The sample validation process begins with a review of the surrogate results. If one surrogate recovery is not within acceptable limits, the sample results could be released based on the

supervisor's decision. For example, if there is matrix interference, the sample result will be released. If an analyte of the surrogate (i.e., phenol vs. phenol- $\alpha$ 6) indicates a positive result and the surrogate recovery is low, the sample will be reanalyzed. If two surrogate recoveries are not within acceptable limits, the sample will be reanalyzed.

## 5.0 DATA REDUCTION AND VALIDATION

All data from sampling tasks will be summarized, validated, and reported by the testing laboratory. An individual from The Dragun Corporation will validate all data as a quality assurance check against laboratory-supplied information.

### 5.1 Contamination in Blank Samples

When contamination is detected in blank samples, the above guidelines will be applied accordingly. In some instances, only some of the blanks indicate contamination and/or the degree of contamination in the blanks may be highly variable. In such cases, professional judgment will be utilized on a case-by-case basis to determine the significance of the compounds which have been quantified.

### 5.2 Holding Times

Any data which exceed the maximum holding time(s) established by the U.S. EPA will be evaluated on a case-by-case basis to determine whether such data should be assigned a validation level of A/Qualitative or U/Unusable. This determination will be founded on: (1) the professional judgment of the validator and an advising expert chemist, (2) an appreciation for the biases resulting from exceeded holding times, and (3) the comparison of the given data with historical data.

### 5.3 Matrix Spike Recoveries/Surrogate Spike Recoveries and Relative Percent Differences

Matrix spike recoveries are conducted by the analytical laboratories and are reported as a percentage of the amount of the known spiked target compounds which are recovered during sample analysis. Surrogate spike recoveries are also conducted by the analytical laboratories and are reported as a percent of the amount of the known spiked non-target compounds which are recovered during sample analysis. Relative percent difference (RPD) is the difference between the primary and secondary spike values divided by the average of the primary and secondary spike recovery value. Spike recoveries and RPDs are commonly used as a measure of soil data validity since natural soil heterogeneity and the absence of uniform contaminant mixing essentially preclude the usefulness of replicate sampling and analysis.

The spike recovery and relative percent difference limits prescribed by the U.S. EPA in its Contract Laboratory Program Statement of Work (10/86) are advisory and will be utilized as a measure of data validity. Data related to average spike recoveries which fall within the prescribed limits dictate that related sample data be considered A/Qualitative or U/Unusable. A decision of whether a validation level of A or U should be assigned to poor average spike recovery-related data will be made by the validator on a case-by-case basis. Obviously, a significant departure of the average spike recoveries from the established limits will result in a significant reduction in the validity of the related data.

#### **5.4 Tentatively Identified Compounds**

Tentatively identified compounds (TICs) are considered A/Qualitative before any validation criteria are applied to these data.

### **6.0 INTERNAL QUALITY CONTROL**

Quality control will involve the collection of field replicates and the use of both field blanks and trip blanks.

Trip blanks for volatile organic compounds (VOCs) will be shipped along with the sample bottles from the laboratory, and will be analyzed at the same time as all other samples. Field blanks will be prepared using site sampling equipment and will be analyzed to determine whether the procedures may be biasing the data.

### **7.0 DATA ASSESSMENT PROCEDURES**

Data from the analytical laboratory will be assessed in accordance with the guidelines provided in this work plan and the laboratory's standard operating procedures. Samples that have not met validation criteria will be identified and documented by the analytical laboratory and The Dragun Corporation.

### **8.0 CORRECTIVE ACTION PROCEDURES**

If the quality control audit results in the detection of unacceptable conditions or data, the project manager is responsible for developing and initiating corrective action procedures.

Corrective action may include:

- Re-analyzing the samples if the holding time criteria permits it.
- Resampling and analyzing.
- Accepting data while acknowledging a level of uncertainty. The reasons for the uncertainty in the data will be documented according to procedures outlined previously.

## **9.0 QUALITY ASSURANCE REPORTS**

Quality assurance reports can be prepared periodically to evaluate and describe the performance of the data measurement systems or the data quality. These reports can include:

- Review of data accuracy, precision, and completeness.
- Results of performance, systems, data, and instrument audits.
- Results of inter-laboratory testing.
- Recommendations.

A schedule for quality assurance report preparation is not anticipated at this time.

Table F-1. Precision and Accuracy Parameters for Methods 8010 and 8260

<u>Target Compound</u>	<u>Accuracy</u>		<u>Precision</u>
	CCV <sup>1</sup>	MS/MDS <sup>2</sup>	RPD <sup>3</sup>
<b>Method 8010</b>			
1,1,1-Trichloroethane (TCA)	80-120%	60-125 %	≤ 25%
Tetrachloroethene (PCE)	80-120%	65-125 %	≤ 25%
1,2-Dichloroethene (DCE)	80-120%	65-135 %	≤ 25%
1,1-Dichloroethane (DCA)	80-120%	60-135 %	≤ 25%
Surrogate		Matrix	
	Water	Other	
Chlorobutane	80-120%	80-120%	≤ 25%
<b>Method 8260</b>			
TCA	52-162%	52-162 %	≤ 25%
PCE	64-148%	64-148 %	≤ 25%
DCE	54-156%	54-156 %	≤ 25%
DCA	59-155%	59-155 %	≤ 25%
Surrogate		Matrix	
	Water	Other	
1,2-Dichlorobenzene- $\alpha$ 4	76-114%	70-121 %	≤ 25%
Toluene- $\alpha$ 8	88-110%	81-117 %	≤ 25%
4-Bromofluorobenzene	86-115%	74-121 %	≤ 25%

<sup>1</sup> Continuing Calibration Verification

<sup>2</sup> Matrix Spike/Matrix Spike Duplicate

<sup>3</sup> Relative Percent Deviation

**APPENDIX G**  
**CHEMICAL HYGIENE PLAN**

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## **1.0 STANDARD LABORATORY PROCEDURES**

An inventory of all chemicals in the lab will be kept with this plan and will be edited by laboratory personnel.

A material safety data sheet (MSDS) will be kept for every chemical that is in the lab. This sheet will contain all necessary precautionary and hazard information for work with a chemical. These sheets will be edited when the chemical inventory sheet is edited.

Rhonda Berger is the designated Chemical Hygiene Officer (CHO) for The Dragun Corporation. She will be responsible for the implementation of The Dragun Corporation's chemical hygiene plan (CHP). She will be working with Christopher Englert, who will make periodic checks on control devices such as the fume hood, emergency showers, eyewashes, respirators, air monitoring systems, and other safety equipment.

### **1.1 General Laboratory Practice**

1. Never work in the building alone. If only a few people are in the workplace with you, let someone know you are working, what you are doing, and when you will be completing your task.
2. Eating, drinking, or applying cosmetics will not be allowed in the lab.
3. Wear eye protection, gloves, and white smock at all times.
4. When working with chemicals, be sure that no other chemical containers are open or near your work area.
5. When mixing chemicals, work only under the fume hood.  
**There are no exceptions to this rule.**

### **1.2 Procedures for Chemical Handling**

Always read labels before handling containers. Do not use a container if it does not have a label on it. In addition, contact your immediate supervisor for further instructions on what to do with the unmarked container and its contents.

Have the MSDS and other chemical references near your work station. Read pertinent information for the chemical(s) you are about to use. Review the proper safety precautions to take, and know what to do if contact or ingestion occurs.

A shower, sink, eyewash, and first aid kit are available, should chemical contact occur. There are also spill cleanup kits. Know where each is located, in what circumstances you should use it, and how to use it.

Always seal chemical containers when finished and return to the appropriate place.

### 1.3 Personal Hygiene

- Wash with soap and water when finished working with chemicals.
- Never sniff or touch chemicals to "test them."
- Never use your mouth to create suction within a pipet.

### 1.4 Protective Clothing and Equipment

Type G, H, or I goggles or glasses will be worn at all times.

When working with corrosive liquids or with allergenic, sensitizing, or toxic chemicals, wear impermeable gloves that have been pre-tested for air holes. When working with more than 10 ml of a corrosive liquid, a type N face mask must be used. The mask should be worn covering the chin, neck, ears, and face.

Appropriate clothing for lab work consists of long-sleeved shirts and pants. Short skirts are not permitted. Shoes must cover the feet completely, be flat, and optimally be made of leather. In addition, the white lab coat must be worn over the protective clothing at all times inside the laboratory.

Periodically check your gloves, eye wear, and lab coat for any defects or problems and have spares should something go wrong.

### 1.5 Housekeeping

Always follow these rules for good housekeeping:

- Chemicals are to remain inside the laboratory only.

- All chemical containers must be legibly labeled with the contents and any hazard precautions. Never use any chemical which is improperly labeled. Chemicals that are not labeled are considered hazardous waste and should be labeled as such and kept in their respective containers.
- When finished with a chemical, return it in a sealed, labeled container to the place it originally resided.
- If a spill should occur, promptly clean it up and dispose of the chemical and the cleaning materials.
- Aisles and hallways around the laboratory, particularly those leading to the shower, must never be blocked by anything.
- The work areas in the laboratory (fume hood, bench tops, floors, etc.) should remain clutter-free. In addition, clean up after every task. Also, the floor area should be swept at the end of the work day and the countertops should be washed.

## **2.0 COMPLETION OF LABORATORY TASKS**

### **2.1 Prior Approval**

The employee will proceed with lab work only with the employer's explicit instructions under the following situations:

- A new experiment or procedure is to be done.
- The chemicals used may produce high toxic concentrations.
- Any change in procedure or chemical dosage is needed.
- Any laboratory safety equipment, such as the fume hood, is malfunctioning, or if sickness due to a suspected malfunction occurs.

In addition, if laboratory personnel are suspected of failing to follow any standard laboratory safeguards described in this plan, the CHO officer will be notified and such failures will be noted.

## 3.0 SPILL/ACCIDENT PROCEDURES

If a health threat such as fire, smoke, or chemical gases should occur, follow this emergency procedure plan:

1. Notify someone and send them for help.
2. Depending on the nature and severity of the emergency, evacuation may be necessary. Everyone in the building should assemble at the front door for evacuation. Inventory of who is present is necessary to assess other actions needed.

### 3.1 Procedure-Specific Safety Procedures

Before starting any procedure, familiarize yourself with the chemicals you are about to use. Know how to mix them and what kind of reactions should occur. Refer to the MSDS, NIOSH Guide, and the Emergency Response Guidebook for necessary precautions. Always have an emergency cleanup kit accessible.

**3.1.1 Toxic Chemicals.** The MSDS often state recommended exposure limits for chemicals. A typical limit may be either threshold limit values (TLVs), permissible exposure limits (PELs), or action levels. After determining the exposure limit for the chemical about to be used, the CHO will determine what control measures will be used for that procedure.

If either the TLVs or PELs is over 50 ppm or 100 mg/m<sup>3</sup>, the chemical user must perform all work under the fume hood.

If the TLVs or PELs is unavailable for a substance, the human median inhalation lethal concentration information, LC<sub>50</sub>, must be assessed. If the chemical of interest has this level greater than 200 ppm or 2000 mg/m<sup>3</sup>, the chemical must be used in a fume hood.

If the TLVs, PELs, or LC<sup>50</sup> is unattainable for a chemical, the chemical is not to be used.

If the vapor pressure of the substance to be used is likely to exceed air concentration limits, all work must be performed under the fume hood.

3.1.2 Procedures for Flammable Chemicals. A chemical may be determined flammable by its flash point. A flash point can be found on the container's label, in the NIOSH Guidebook, or on the MSDS.

Any chemical with a flash point below 200°F (93.3°C) will be considered a fire hazard.

When working with fire-hazard chemicals, follow the 29 CFR, subparts H and L; NFPA Manual 30, "Flammable and Combustible Liquids Code," and the NFPA Manual 45, "Fire Protection for Laboratories Using Chemicals."

Fire-hazard chemicals should be stored in a flammable-solvent storage area, and the area should be clearly marked as a flammable materials storage area.

Fire-hazard chemicals must be used under the fume hood. Take extreme caution that no other sources of ignition are near your work area.

3.1.3 Procedures for Reactive Chemicals. Reactivity information can be found in several books. Labels may also state this information.

A reactive chemical is:

- Ranked as unstable in 29 CFR 1910.1450.
- Ranked by the NFPA as 3 or 4.
- Described by the DOT as an oxidizer, an organic peroxide, or a class A, B, or C explosive.
- Known to be reactive with other chemicals.

All such reactive chemicals must be handled with all necessary safety precautions. Do not mix with anything before obtaining approval and safeguarding your personal protection with all necessary precautions.

All reactive chemicals will be stored separately and the storage area will be clearly marked "reactive chemicals."

3.1.4 Procedures for Corrosive and Contact-Hazard Chemicals. Look for corrosivity, allergenic, and sensitizer information on the MSDS and also on the chemicals' label. Some guidelines such as OSHA's standards, DOT's regulations in 49 CFR and the U.S. EPA's regulations found in 40 CFR will state this information.

A corrosive chemical is defined as:

- One that fits the OSHA definition of corrosive in Appendix A of 29 CFR 1910.1200.
- One that fits the U.S. EPA definition of corrosive in 40 CFR 261.22, which says that the chemical's pH is greater than 12.5 or less than 2.0.
- One that is known to be corrosive to living tissue.

A contact-hazard chemical is an allergen or sensitizer that:

- Is identified as such on the label or in the MSDS.
- Is identified in the medical or industrial hygiene literature.
- Is known to be an allergen or sensitizer.

Wear safety goggles, a face shield, gloves tested for the absence of pin holes and known to be resistant to permeation or penetration, and a white laboratory coat. Handle with care.

### 3.1.5 Procedures for Carcinogens, Reproductive Toxins, and Substances Which Have a High or Unknown Degree of Acute Toxicity. A carcinogen is defined as any substance defined in 29 CFR 1910.1450, or so stated in the MSDS.

A reproductive toxin is defined as any substance described as such in the MSDS.

A high degree of acute toxicity is defined as any substance for which the LD<sub>50</sub> data described in the MSDS causes the substance to be classified as a "highly toxic chemical" as defined in ANSI Z129.1.

An unknown degree of acute toxicity is defined as any chemical for which there is no known statistically significant study that established its toxicity.

The following procedures should be followed when working with any carcinogen, reproductive toxin, or substance with a high or unknown degree of acute toxicity (i.e., "toxin"):

The "toxins," if ever used in the future, will be handled only by those trained to handle them. In addition, they will be used only under the fume hood. In addition, the boundaries of the work area would be clearly marked.

If trained personnel should ever need to use these "toxins," they will:

- Use the smallest quantity possible.
- Use high-efficiency particulate air (HEPA) filters.
- Store and retrieve the chemicals themselves.
- Decontaminate the work area when work is completed.
- Prepare wastes from work with the "toxins" which is in accordance with disposal procedures consistent with the Resource Conservation and Recovery Act (RCRA).

Disposable, long-sleeved clothing and gloves should be worn while working with the "toxins." Gloves should be known to be resistant to permeation by the target chemicals.

All "toxins" must be stored in a locked area which has a slightly negative pressure as compared to the rest of the building.

Jewelry should not be worn while working with these "toxins" because decontamination is difficult or impossible.

## 4.0 CONTROL MEASURES

Keeping control over the lab means being aware of what is going on inside it. Always use every precaution possible when working with any chemical, no matter how harmless it seems. Be prepared to act before a misfortune occurs. Periodically check equipment for any malfunctions or maintenance needs.

### 4.1 The Fume Hood

Remember to always work under the fume hood when mixing any chemicals. (Be sure that the fume hood is providing at least 70 linear feet per minute of air flow.)

The employee will pay strict attention to the following:

- Never use the fume hood to dispose of any substance.
- Always work well inside the hood with the door down whenever chemicals are being used inside it. In addition, the hood fan must always be "on" when a chemical is inside it, even if the chemical is not being used at the moment.
- Check the fume hood regularly for any vent blockage and for cleanliness. Like any other equipment, it should be cleaned and maintained regularly to prevent any problems which could occur.
- If the fume hood should fail or malfunction in any way, discontinue what you are doing. Cap all chemicals you were using. Make sure all containers are labeled and store them. They must not stay under the hood. The fume hood's working area should always be free of clutter and never be used for storage for any materials, chemicals, or equipment of any kind. Clean up the work area. Keep a detailed log of where you were with your procedure until the problem with the fume hood is permanently solved.

#### 4.2 Eyewash Fountains and Safety Showers

The laboratory has two eyewash fountains. The first is a permanent one which is mounted near the fume hood. Always keep the path to the eyewash clean and unobstructed.

The second eyewash is a portable container which can be placed in any location in which you are working. Know how to operate it.

Regularly check both eyewash units to ensure they are functioning properly. Report any malfunctions immediately so a replacement or repair can be done as soon as possible.

#### 4.3 Respirators

Whenever you are working with chemicals which may expose you to vapor or particulate concentrations greater than the PELs, TLVs, or action level, use a respirator in addition to the fume hood.

The following are 29 CFR 1910.134 requirements and should be followed.

- Follow the written standard operating procedures governing the selection and use of respirators.
- Any employee who is likely to need the use of a respirator must be given formal training in proper usage, inspection, and maintenance.

Never use odor as a means of determining if a chemical's exposure limit is being exceeded. If you feel limits are being exceeded, tell your supervisor. Wear a respirator until you are shown that the chemical's concentration is below the exposure limit. Do not remove the respirator if you believe that the chemical's concentration will increase, or if your supervisor has told you to continue wearing it.

## **5.0 THE STORAGE OF FLAMMABLE LIQUIDS**

All fire-hazard chemicals in quantities greater than 500 ml will be kept in metal safety cans designated for storage. The cans will be clearly marked according to their contents.

- Never disable the spring-loaded closure.
- Always keep the flame-arrestor screen in place. Replace it if punctured or damaged.

The cans containing the fire-hazard chemicals will be kept in a separate, designated spot.

- Each storage area will contain only compatible materials.
- No paper or flammable material will be inside the storage area.
- Do not overload the storage cabinets. If more space is required, order a new cabinet.

## **6.0 RECORD-KEEPING**

Documenting an employer's compliance with the Laboratory Control Standard is required by 29 CFR 1910.20. The following documentation should be maintained for 30 years. Records will be accessible to employees at all times.

- Records of air concentration monitoring results.
- Exposure assessments.
- Medical consultations and examinations.

Documentation of training sessions, MSDS distribution, and safety training sessions must be kept.

Records should be kept in the event of low work time resulting from an exposure or accident at work. Use OSHA Form 200 to record lost time.

Employee exposure complaints and suspected exposures must be reported, even if they are unfounded.

Other examples of good documentation would be:

- All safety suggestions from employees.
- Near-miss reports used to reassess current procedures.
- Repair and maintenance records for control devices.
- All complaints, investigations, and outcomes.

U.S. EPA and state agencies also have special record-keeping requirements. Under sections 8(c) and 8(e) of the Toxic Substances Control Act and 40 CFR 716 and 717, record-keeping of allegations and the reporting of suspect hazards from the adverse effects of chemical exposure are required.

## **7.0 EMPLOYEE TRAINING**

The type of training needed for the lab is determined by the employer. It will depend upon the needs of the laboratory personnel. However, the laboratory personnel should be able to answer all safety and health questions posed by an OSHA inspector. Thus, any formal training should be proven effective by observation and questions.

The employer should provide the following:

- All laboratory employees will be provided with information and training pertinent to the chemicals used in The Dragun Corporation's laboratory facilities.
- Additional training will be given when an employee will be working with new chemicals or is given new procedures.
- Employees will be informed about the Laboratory Control Standard via VHS tapes, OSHA booklets, and verbal training.
- This chemical hygiene plan will remain with the MSDS binder, clearly labeled, in the laboratory's bookcase.
- All PELs, action levels, and exposure limits for hazardous chemicals used in The Dragun Corporation's lab will be readily available through the references maintained in the lab's files.
- All employees must report signs and symptoms associated with exposure to chemicals to Rhonda Berger, CHO.
- Employees will have training and also have access to information on the precautions and hazards associated with the chemicals used in The Dragun Corporation's lab. They will be supplied with all necessary health and safety information, including emergency procedures and phone numbers, and The Dragun Corporation's chemical hygiene plan.

## **8.0 EXPOSURE ASSESSMENTS, MEDICAL CONSULTATIONS, AND EXAMS**

If an employee feels that reasonable exposure has occurred, a medical doctor should be consulted at The Dragun Corporation's expense.

The Dragun Corporation will promptly investigate all employee-reported incidents in which there is a possibility of employee overexposure to a toxic substance.

Overexposure may constitute the following events:

- A chemical was spilled or leaked from a container.
- Direct skin or eye contact with a chemical occurred.
- Any abnormal symptoms which occur in the lab lessen when the victim is outside, but return when the employee returns to the lab.
- Two or more lab employees have the same complaint.

### **8.1 Exposures**

All exposure complaints, with no exceptions, must be documented. If no assessment of the event occurs, reasons must be included in the original documentation with the complaint. If an investigation proceeds, a formal exposure assessment will be done. However, the assessment will be conducted only after the victim has been treated.

### **8.2 Exposure Assessment**

The purpose of the assessment is to determine if there was, or was not, an exposure which may have caused harm to one or more persons, and also to identify the chemicals involved with the exposure. Furthermore, exposure assessments determine facts and do not, in themselves, make recommendations.

The following will be included in the exposure assessment:

1. The complainant and/or the victim will be interviewed.

2. All essential information regarding the incident will be documented, including:
  - Chemicals under suspicion.
  - All chemicals used by the victim.
  - Chemicals being used by other persons in the lab.
  - Chemicals stored at the work station where the event occurred.
  - Symptoms exhibited by the victim.
  - Comparing the victim's symptoms to those stated in the MSDS for any chemical involved.
  - Were all necessary safety precautions taken?
  - Were the air monitoring devices working? Are the air measurements consistent with the reported information?

The air in the lab will be monitored for the suspected chemicals. Also, a determination will be made on whether or not the present control measures and safety procedures/precautions are adequate for the work being conducted.

### 8.3 Informing the Employees

At the time of receipt of the air monitoring results, all employees will be notified of the results.

### 8.4 Medical Consultation and Exams

If, based on the results of the exposure assessment, the victim is suspected or known to have been exposed, that employee will seek consultation from a medical doctor. The doctor should be knowledgeable about the appropriate diagnostic techniques to use to determine differential diagnoses.

An employee will be advised by The Dragun Corporation to seek professional medical advice if:

- Symptoms possibly related to overexposure are observed.
- Monitoring shows that exposure may have been above the action level or PEL level.
- There has been a spill or leak of a hazardous chemical.

In addition, The Dragun Corporation will supply the doctor with:

- The identity of the hazardous chemicals in question.
- The conditions of overexposure.
- The signs or symptoms the victim has experienced.

The doctor should supply The Dragun Corporation with:

- Any recommendations for follow-up visits.
- Results from the consultation, exam, and any tests conducted.
- Conclusions regarding any medical condition which could put the employee at an increased risk.
- A statement that the victim has been informed of the results of the consultation, exam, and the doctor's assessment regarding any further health condition which may require further treatment and/or create a further health risk.

The doctor or employee is not required to inform The Dragun Corporation of any medical condition which is not specifically related to the occupational exposure. In addition, the results from the consultation, exam, and doctor's assessments should not reveal any specific findings that are not clearly related to the occupational exposure. However, the results from the consultation, exam, and doctor's assessments should reveal any specific findings that are related to and can affect the interpretation of present and future medical data regarding the significance of the occupational exposure.

### 8.5 Documentation

All memos, notes, reports, findings, thoughts, suspicions, and conclusions regarding the overexposure to hazardous chemicals will be kept as part of the record.

### 8.6 Notification

Employees will be notified by The Dragun Corporation and the doctor of the results of medical consultations or examinations with regard to any medical condition that exists or might exist as a result of overexposure to a hazardous chemical.

## **9.0 THE EMERGENCY PROCEDURE PLAN**

If any "emergency" situation occurs, the following plan will be followed by all employees at The Dragun Corporation:

1. Any person or persons witnessing an emergency will notify Rhonda Berger, Christopher Englert, or Bryan Alexander for help.
2. The above person(s) will decide if evacuation is necessary.
3. If evacuation is deemed necessary, an emergency call will be made by the above person(s) and all Dragun associates will meet at the front door. The CHO officer, Rhonda Berger, and the receptionist will be responsible for accounting for all associates.

The following sheet, which contains emergency telephone numbers and routes to the nearest hospital, will remain posted near the telephone in the lab for quick reference or for taking to a "safe zone" telephone.

### **A. EMERGENCY INFORMATION**

Ambulance . . . . .	477-2355 (Fleet)
Hospital Emergency Room . . . . .	661-6450

Poison Control Center .....	1-800-462-6642
Police .....	911 or 477-0911
Fire Department .....	911 or 477-0911

### EMERGENCY CONTACTS

Peggy Miller will contact personal emergency contacts for everyone involved in an emergency.

### B. EMERGENCY ROUTES

**HOSPITAL:** The closest hospital is Henry Ford Medical Center. Go northwest on Northwestern Highway to Orchard Lake Road. Turn right (north) on Orchard Lake Road. Take Orchard Lake Road to Maple Road (15 Mile Road). Turn left (west). The hospital is approximately three miles west of Orchard Lake Road, on the left (south) side of Maple Road, just past Drake Road.

**SITE**

**EVACUATION:** Contact: Rhonda Berger, Christopher Englert, Earl Kenzie, or Bryan Alexander. The decision for evacuation is left to them. If they deem evacuation necessary, they will make the call for help and all associates will meet at the front, main door. Rhonda Berger and the receptionist will account for all associates.

In addition to The Dragun Corporation's chemical hygiene plan, all laboratory associates will follow all laboratory stipulations which apply to the laboratory as mandated in the Federal Register, Volume Number 55 Number 21 which appeared on Wednesday, January 31, 1990.

In addition, all associates will follow the OSHA Compliance Manual for all aspects which are or are not duplicated in this plan.

**APPENDIX H**

**HEALTH AND SAFETY PROGRAM**

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## **1.0 INTRODUCTION**

The Dragun Corporation began a formal program of site risk assessment and implementation of mitigative health and safety programs in May 1988. At that time, existing departmental policies/practices were collected and reviewed, additional needs were identified, and a corporate personnel health and safety plan was drafted.

Currently, The Dragun Corporation's Personnel Health and Safety Committee (PHSC) regularly reviews health and safety issues, updates practices as new information becomes available, oversees administration of the Health Monitoring Program and provides guidance for personnel training as appropriate. The PHSC is a corporate entity, effectively precluding any departmental and contract pressures on health and safety policy decisions.

Each project site is classified hazardous or non-hazardous by the PHSC after a review of available data. Prior to onsite activities at those sites classified as hazardous, a summary safety plan must be completed by the project engineer/scientist. This is accomplished by a review of available information on the site to assess the potential risks and provide an initial determination of personal protection requirements. The summary safety plan is subsequently reviewed and must be approved by a member of the PHSC. The designated site safety officer monitors actual site conditions and may alter these requirements as needed. In all cases, personnel safety is the paramount factor in decision-making.

## **2.0 HEALTH MONITORING AND SAFETY PROGRAM**

To protect the health and safety of employees assigned to work at hazardous waste sites, The Dragun Corporation has developed and implemented a Health and Safety Program. This program is administered by a committee consisting of representatives of The Dragun Corporation's technical department staff with support from medical advisors.

In addition to The Dragun Corporation employees, subcontractors and consultants working on hazardous waste sites will be enrolled in an equivalent Health Monitoring Program and receive health and safety indoctrination prior to commencing work on the site. Indoctrination, training, and periodic follow-up are conducted as appropriate. Indoctrination and training includes:

- Site history
- Inventory of site chemicals known or suspected (will be updated and reviewed at each stage of the field investigation program)
- Project organization

- Work plan review
- Project documentation
- Review of site safety plan (site safety plans are updated as new information becomes available)
- Review of decontamination procedures
- Proper use and care of personal protective equipment
- Proper calibration and use of monitoring equipment
- Emergency response procedures
- Accident reporting procedures
- Contingency plans

The site-specific information required to address the areas noted above is presented in summary safety plans prepared for each site. The plans are intended to provide a framework within which information may be updated and ongoing decisions made regarding actual health and safety concerns at the site. The summary site safety plan format is presented as Appendix H1.

### **3.0 MEDICAL SURVEILLANCE PROCEDURES**

#### **3.1 Health Monitoring Program**

Designated personnel of The Dragun Corporation are enrolled in the health monitoring program. This program consists of an initial medical examination to establish the employee's general health profile and provides important baseline laboratory data for later comparative study.

The contents of the initial comprehensive physical examination and laboratory testing routine is given in Table H-1. Follow-up examinations are completed for all personnel enrolled in the health monitoring program on an annual basis, or more frequently if project assignments warrant testing following specific field activities. Follow-up examinations are tailored to the exposures recorded by the individual. The levels of potential exposure that The Dragun Corporation personnel are subject to in carrying out hazardous waste work assignments are recorded by the individual and reviewed by the site supervisor on a daily basis.

### 3.2 Review of Exposure Symptoms

Symptoms of exposure to hazardous materials will be reviewed for each site in order to indicate to personnel the recognized signs of possible exposure to those materials. This information will be supplemented with a discussion of the need for objectivity in the personal health assessment to account for normal reaction to stressful situations. The site safety officer will be watchful for outward evidences of changes in worker health. These outward symptoms may include skin irritations, skin discoloration, eye irritation, muscular soreness, fatigue, nervousness or irritability, intolerance to heat or cold, or loss of appetite. Employees will routinely be asked to assess their general state of health during the project.

Special medical monitoring may be identified for certain sites.

## **4.0 PERSONAL PROTECTION LEVEL DETERMINATION**

The level of personal protective equipment required shall be determined by the type and levels of waste or spill material present at the site where project personnel may be exposed. In situations where the types of waste or spill material onsite are unknown, the hazards are not clearly established, or the situation changes during onsite activities, the site safety officer must make a reasonable determination of the level of protection that will assure the safety of investigators and response personnel until the potential hazards have been determined through monitoring, sampling, informational assessment, laboratory analyses, or other reliable methods. Once the hazards have been determined, protective levels commensurate with the hazards will be used. Protective requirements will be evaluated on a continuous basis to reflect new information as it is acquired.

Preparation of site-specific plans will be based on the site-specific information made available through site files, RAMP, and FIT reports, as well as any other sources identified.

### Level D

Level D is the basic work uniform, selected when site hazards are judged to be minimal. Investigators and response personnel, however, must not be permitted to work in civilian clothes. Level D often requires carrying an escape respirator.

## **5.0 WORKER SAFETY PROCEDURES**

Workers will be expected to adhere to the established safety practices for their respective specialties (e.g., drilling, laboratory analysis, construction, etc.). The need to exercise

caution in the performance of specific work tasks is made more acute due to weather conditions, restricted mobility, and reduced peripheral vision caused by the protective gear itself, the need to maintain the integrity of the protective gear, and the increased difficulty in communicating caused by respirators. Work at the site will be conducted according to established protocol and guidelines for the safety and health of all involved. Among the most important of these principles for working at a hazardous waste site are:

1. In any unknown situation, always assume the worst conditions and plan responses accordingly.
2. Employ the buddy system. Establish and maintain communication. In addition to radio communications, it is advisable to develop a set of hand signals, as conditions may greatly impair verbal communications.
3. Minimize contact with excavated or contaminated materials. Plan work areas, decontamination areas and procedures to accomplish this. Do not place equipment on drums or on the ground. Do not sit on drums or other materials.
4. Employ disposable items when possible to minimize risks during decontamination and possible cross-contamination during sample-handling. This will require a common sense approach to potential risks and costs.
5. Smoking, eating, or drinking after entering the work zone and before decontamination will not be allowed. Oral ingestion of contaminants is probably the second most likely means of introduction of the toxic substances into the body (inhalation being the first).
6. Avoid heat and other work stresses related to wearing the protective gear. Work breaks should be planned to prevent stress-related accidents or fatigue.
7. Maintain monitoring systems. Conditions can change quickly if subsurface areas of contamination are penetrated.
8. Conflicting situations which may arise concerning safety requirements and working conditions must be addressed and resolved rapidly by the site safety officer to relieve any motivations or pressures to circumvent established safety policy.
9. Unauthorized breaches of specified safety protocol will not be allowed. Personnel unwilling or unable to comply with the

established procedures will be replaced. Any changes in established procedure should be documented on the form provided. The change should have a very specific, valid basis and must be approved by the site safety officer.

10. Be observant of not only one's own immediate surroundings but also that of others. Everyone will be working under constraints to awareness and it is a team effort to notice and warn of impending dangerous situations. Extra precautions are necessary when working near heavy equipment while utilizing personnel protective gear. Vision, hearing, and communication are restricted by protective gear.
11. Use of contact lenses will not be allowed onsite. These prevent proper flushing should corrosive or lachrymose substances enter the eyes.
12. Sites potentially requiring Level C or B protection will require the removal of facial hair (except moustaches) to allow a proper face-piece fit.
13. Rigorous contingency planning and dissemination of plans to all personnel minimizes the impact of rapidly changing safety protocols in response to changing site conditions.
14. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.
15. Be aware that chemical contaminants may mimic or enhance symptoms of other illnesses or intoxication. Avoid excess use of alcohol and working with an illness during field investigation assignments.
16. The site leader, the site safety officer, and sampling personnel shall maintain records in a bound notebook to record daily activities, meetings, facts, incidents, data, etc., relating to the project. These record books will remain on the site for the duration of the project so that replacement personnel may add information in the same record book, maintaining continuity. These notebooks and daily records will become part of the permanent project file.

## **6.0 SITE SAFETY EQUIPMENT**

In addition to personnel protective gear designated for the assigned level, various monitoring and safety equipment is maintained onsite. Minimum onsite equipment will generally include:

- Photoionization meter
- Combustible gas indicator (explosimeter)
- Oxygen meter or oxygen deficiency alarm
- Chemically reactive indicating tubes (specific to the site hazards)
- Fire extinguishers
- First aid kits
- Eyewash station
- Radiation survey meter or radiation alert
- Transportation suitable for emergency response
- Organic vapor analyzer (optional)

Additional equipment may be specified and obtained as field conditions dictate. An equipment list and field safety gear requirements are specified in the site safety summary (Appendix H1).

## **7.0 EMERGENCY PLANNING**

### **7.1 Emergency Medical Services**

Prior to site investigation or activity on hazardous sites, nearby health facilities will be evaluated to determine their capabilities in relation to the needs of onsite project staff. Criteria such as emergency department physician coverage, decontamination capabilities and available medical specialists are evaluated.

### Onsite First Aid

- An industrial first aid kit will be provided at the work site and contents of the kit will be checked weekly and restocked as necessary. Other equipment may include: oxygen, backboard and straps, splints, and a cervical collar.
- At least one person qualified to perform first aid will be present onsite at all times during work activities. This person will have earned a certificate in first aid training from the American Red Cross or will have received equivalent training. Designated first aid providers will receive regular review training from the American Red Cross or participate in an equivalent session.
- An emergency shower and eyewash station will be provided at the work site, as well as flushing water for decontamination of gloves, clothing, tools, equipment, etc.

### Transportation to Emergency Treatment

- A vehicle will be available at all times for use in transporting personnel to the hospital (in the event an ambulance is unnecessary or unavailable).
- Personnel stretchers will be located at the work site for use in transporting personnel to the vehicle. Alternate transportation routes to hospitals will be established prior to onsite activity.

### 7.2 Contingency Planning

Prior to commencement of onsite activities, field personnel will review safety considerations with the site safety officer (SSO). The SSO is responsible for adherence to the designated safety precautions and assumes the role of onsite coordinator in an emergency response situation.

All onsite personnel will be familiarized with both the primary and secondary routes to the nearest hospital (which may be shown on a figure or local map), as well as the location of the nearest working telephone or radio communication device. Each will receive a list of emergency phone numbers.

The local hospital and emergency response team will be advised in advance by the SSO of the work to be performed. The hospital will also be briefed on the availability of personnel health data and technical support through Envirologic Data.

### 7.3 Potential Hazards

The most common hazards associated with hazardous waste site investigation include: (1) accidents, (2) contacts or ingestion of hazardous materials, (3) explosion, and (4) fires.

7.3.1 Accidents. Accidents must be handled on a case-by-case basis. Minor cuts, bruises, muscle pulls, etc., will still allow the injured person to undergo reasonably normal decontamination procedures prior to receiving direct first aid. More serious injuries may not permit complete decontamination procedures to be undertaken, particularly if the nature of the injury is such that the victim should not be moved.

The nature and degree of surface contamination at a site is generally low enough that emergency vehicles could reach the victim onsite without undue hazard. However, in the event that onsite access is limited, accident victims may be transported to a point accessible by an ambulance by Dragun personnel trained for this response.

7.3.2 Contact With and/or Ingestion of Hazardous Materials. Properly prescribed and maintained protective clothing and adherence to established safety procedures are designed to minimize this hazard. However, it is still a possibility that contact with or ingestion of materials may occur. One possibility for exposure is the puncture of a buried drum of liquid during drilling operations which might cause the drum contents to come into contact with personnel. Standard first aid procedures should be followed. The drilling rig will have a tank of water which may be useful in some circumstances, particularly to flush contaminants off any exposed skin areas. Eyewash bottles will also be maintained at the site in case of emergencies. In case of ingestion or other than minor contact with a known substances, the local Poison Control Center and the hospital should be contacted and the victim should be taken there immediately for further treatment and observation.

7.3.3 Explosion: The drilling crew should be keenly aware of combustible gas meter readings and withdraw at any indication of imminently hazardous conditions (greater than 30% LEL). The detection of such conditions shall be reported to local agencies for potential execution of the evacuation plan should the situation be assessed as warranting such response.

7.3.4 Fire. The combustible gas meter also warns of imminent fire hazards at borings. The greatest fire hazard at the site should be recognized as handling the fluids (e.g., methanol, acetone) used for certain decontamination procedures. No smoking or open flames are allowed onsite. Carbon dioxide fire extinguishers will be kept at the drilling rig and the decontamination area/field office. The Fire Department, previously informed of site activities, will be called as needed.

## 7.4 Evacuation Response Levels

Evacuation responses will occur at three levels: (1) withdraw from immediate work area (100+ feet upwind), (2) site evacuation, and (3) evacuation of surrounding area. Anticipated conditions which might require these responses are described below:

### Withdrawal Upwind (100 or more feet)

- Sensing ambient air conditions as containing greater contaminant concentrations than guidelines allow for the type of respiratory protection being worn. The work party may return upon donning greater respiratory protection and/or assessing the situation as transient and past.
- Breach in protective clothing or minor accident. The party may return when tear or other malfunction is repaired and first aid or decontamination has been administered.
- Respirator malfunctions and must be replaced.

### Site Evacuation

- Sensing ambient air conditions as containing explosive and persistent levels of combustible gas or excessive levels of toxic gases.
- Fire or major accident.
- Imminent explosion or explosion.

## **8.0 DECONTAMINATION**

### 8.1 Equipment Decontamination

Equipment to be decontaminated during the project may include: (1) drill rig, (2) tools, (3) monitoring equipment, (4) respirators, (5) sample containers, (6) truck or trailer, and (7) laboratory equipment.

All decontamination will be done by personnel in protective gear appropriate for the level of decontamination, determined by the SSO. The decontamination work tasks will be split or rotated among support and work crews. Decontamination procedures within the trailer (if

used) should take place only after other personnel have cleared the "hot area," moved to the clean area, and the door between the two areas has been closed.

Miscellaneous tools and samplers will be dropped into a plastic pail, tub, or other container. They will be brushed off and rinsed (outside, if possible) and transferred into a second pail to be carried to further decontamination stations. They will be washed with a detergent solution, rinsed with methanol or acetone (if required), rinsed with another detergent solution, and finally rinsed with clean water.

8.1.1 Drilling Rig and Tools. It is anticipated that the drill rigs will be contaminated during test pit/borehole activities. They will be cleaned with high pressure water or portable high pressure steam followed by a soap-and-water wash and rinse. Loose material will be removed by brush. The person performing this activity will usually be utilizing Level D protection.

8.1.2 Sample Containers. Exterior surfaces of sample bottles will be decontaminated prior to packing for transportation to the analytical laboratory. Sample containers will be wiped clean at the sample site, but it will be difficult to keep the sample containers completely clean. The samples will be taken to the decontamination area. Here they will be further cleaned, as necessary, transferred to a clean carrier, and the sample identities noted and checked off against the chain-of-custody record. The samples, now in a clean carrier, will be stored in a secure area prior to shipment.

8.1.3 Monitoring Equipment. Monitoring equipment will be protected as much as possible from contamination by draping, masking, or otherwise covering as much of the instruments as possible with plastic without hindering the operation of the unit. The HNU meter, for example, can be placed in a clear plastic bag which allows reading of the scale and operation of the knobs. The HNU sensor can be partially wrapped, keeping the sensor tip and discharge port clear.

The contaminated equipment will be taken from the drop area and the protective coverings removed and disposed of in the appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe. The units can then be taken inside in a clean plastic tub, wiped off with damp disposable wipes, and dried. The units will be checked, standardized, and recharged as necessary for the next day's operation. They will then be prepared with new protective coverings.

8.1.4 Laboratory Equipment. Sample handling areas and equipment will be cleaned/wiped down daily. Disposable wipes will be used and discarded into a plastic bag. These will subsequently be taken to and placed in the disposal drum for final disposition. For final cleanup, all equipment will be disassembled and decontaminated. Any equipment which cannot be satisfactorily decontaminated will be disposed of (e.g., glassware, covers for surfaces), as previously indicated.

## **9.0 DOCUMENTATION AND RECORD-KEEPING**

Field activity documentation forms will include, at a minimum:

- Daily records kept by the technical leader or designee.
- Site surveillance record kept by the SSO.
- Sampling-related records kept by sample collection team.
- Chain-of-custody records for each sample collected.
- Daily exposure record for each person on site.

## **10.0 UPDATING OF HEALTH AND SAFETY PLAN**

The SSO is responsible for maintaining proper documentation regarding daily safety log sheets. If any deficiency is encountered in the health and safety plan, a report will be prepared and forwarded to the health and safety coordinator at The Dragun Corporation and copies sent to the project manager and technical director. The SSO will immediately initiate necessary changes to improve protection of field staff.

During the remedial investigation process or after initial field investigation, any new chemical hazard encountered will be evaluated, and safety plans modified to reflect the effect of that chemical hazard. Similarly, any physical hazards that are discovered will be addressed by the SSO and reported.

## **11.0 REFERENCE GUIDES FOR HAZARDOUS MATERIALS**

Reference guides for material classification determinations are:

The Merck Index, Ninth Edition. 1980. Merck, Sharp & Dohme Ltd.

Handbook of Chemistry & Physics, Sixty-Fourth Edition. 1984. CRC Press.

Pocket Guide to Chemical Hazards. 1980. NIOSH/OSHA, DHEW (NIOSH) Publication number 78-120.

Registry of Toxic Effects of Chemical Substances, Eighth Edition. 1978. NIOSH.

Sax NI. 1984. Dangerous Properties of Industrial Materials. Van Nostrand Reinhold Co.

Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment. 1984. Adopted by ACGIH.

**APPENDIX H1**  
**SITE SAFETY PLAN**

### **EMERGENCY INFORMATION - LOCAL**

Ambulance \_\_\_\_\_

Hospital Emergency Room \_\_\_\_\_

Poison Control Center \_\_\_\_\_

Police \_\_\_\_\_

Fire Department \_\_\_\_\_

Airport \_\_\_\_\_

Explosives Unit \_\_\_\_\_

U.S. EPA Contact \_\_\_\_\_

### **SITE RESOURCES**

Water Supply \_\_\_\_\_

Telephone \_\_\_\_\_

Radio \_\_\_\_\_

Other \_\_\_\_\_

## **EMERGENCY INFORMATION**

Ambulance ..... 477-2355 (Fleet)

Hospital Emergency Room ..... 661-6450

Poison Control Center ..... 1-800-462-6642

Police ..... 911 or 477-0911

Fire Department ..... 911 or 477-0911

## **EMERGENCY CONTACTS**

Peggy Miller will contact personal emergency contacts for everyone involved in an emergency.

## **EMERGENCY ROUTES**

**HOSPITAL:** The closest hospital is Henry Ford Medical Center. Go northwest on Northwestern Highway to Orchard Lake Road. Turn right (north) on Orchard Lake Road. Take Orchard Lake Road to Maple Road (15 Mile Road). Turn left (west). The hospital is approximately three miles west of Orchard Lake Road, on the left (south) side of Maple Road, just past Drake Road.

**SITE**

**EVACUATION:** Contact: Rhonda Berger, Christopher Englert, Earl Kenzie, or Bryan Alexander. The decision for evacuation is left to them. If they deem evacuation necessary, they will make the call for help and all associates will meet at the front, main door in the lobby. Rhonda Berger and the receptionist will account for all associates.

## **PERSONNEL SAFETY EQUIPMENT CHECK LIST**

**Face Mask**

**Safety Glasses**

**Ear Protection**

**Gloves, inner**

**Gloves, outer**

**Splash Aprons**

**Safety Shoes**

**Dosimeters**

**First Aid Equipment**

**Utility First Aid Kit**

**Eyewash Station**

**Emergency Shower**

**Fire Extinguisher**

## **DECONTAMINATION EQUIPMENT/MATERIALS**

Glass Containers for:

- Contaminated liquids
- Contaminated disposables

Deionized water

Detergent

Disposable wipes

High pressure water sprayer

- Cold
- Hot

Methanol/acetone/isopropanol

Dilute nitric acid solution for glassware

Pipettes

Plastic wrap

Scrub brushes

Wash tubs

Ziploc bags

Table H-1. Typical Baseline Health Monitoring Program

1. PHYSICAL EXAMINATION

- a. Medical history
- b. Medical examination
- c. Vision:
  - near/distant
  - color
- d. Audiometry (optional, assignment dependent)
- e. Radiology: PA/LAT
- f. Spirometry
- g. Electrocardiogram (optional, age and history dependent)

2. LABORATORY ANALYSIS

- a. Hematology
    - complete blood count
    - red blood cell count
    - hemoglobin
    - platelets
    - sedimentation rate
  - b. Blood Chemistry
    - Multi-22
    - calcium
    - glucose
    - uric acid
    - total protein
    - bilirubin
    - SGPT
    - potassium
    - creatinine
    - globulin
    - triglycerides
    - gamma GT
    - serum iron
    - iron binding capacity
    - acetyl cholinesterase
    - plasma
    - red blood cell
    - free erythrocyte porphyrin
  - c. Urine Analysis
    - pH, specific gravity, appearance, sugar, etc.
- |                         |        |
|-------------------------|--------|
| white blood cell count  |        |
| hematocrit              |        |
| indices: MCV, MCH, MCHC |        |
| inorganic phosphate     |        |
| blood urea nitrogen     |        |
| cholesterol             |        |
| albumin                 |        |
| alkaline phosphatase    | sodium |
| chloride                |        |
| CO                      |        |
| CO/globulin ratio       |        |
| BUN/creatinine ratio    |        |
| T3 uptake               |        |
| Total T4                |        |
| Immunoprofile III       |        |

**APPENDIX I**  
**DATA MANAGEMENT PLAN**

## TABLE OF CONTENTS

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3.0 DATA TRANSFER AND INVENTORY .....	2
4.0 DATA VALIDATION, REDUCTION, AND ANALYSIS .....	2

## **1.0 INTRODUCTION**

This data management plan outlines the procedures to be followed for the inventory, control, storage, and retrieval of data collected during the field investigations at the site.

## **2.0 ORGANIZATION**

Project files containing data and reports generated during the course of the investigation will be maintained at the offices of The Dragun Corporation according to the procedures outlined in this document.

Data generated by drilling contractors, analytical laboratories, and all other subcontractors will be forwarded directly to The Dragun Corporation. Laboratory documentation will be maintained for the purpose of validating analytical data generated during the course of investigation.

## **3.0 DATA TRANSFER AND INVENTORY**

All incoming data and reports will be logged, stamped with the date of receipt, and filed. If distribution is required, the appropriate number of copies will be made and distributed.

All outgoing data and reports will also be logged and dated. All outgoing reports and maps will be reviewed by the project manager. All final reports will be signed by the author(s).

All notes from project meetings and telephone conversations will be maintained by project personnel. Project personnel will retain these notes until the project is concluded; at that time, the notes will be placed in the project files. Access to the project files will be limited to project personnel at The Dragun Corporation.

## **4.0 DATA VALIDATION, REDUCTION, AND ANALYSIS**

The project manager is responsible for data reduction and analysis. Data validation will be performed by project personnel. Because analysis of the project data is likely to require data reduction for the preparation of tables, charts, and maps, all reduced data will be checked against the original by someone other than the person who prepared the table, chart, or map.

**APPENDIX J**

**RESPONSE TO THE USEPA COMMENTS**



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IV  
345 COURTLAND STREET, N.E.  
ATLANTA, GEORGIA 30365

JAN 21 1993

Mr. James Mersereau-Kempf  
Environmental Geologist  
Dow Corning Corporation  
3901 S. Saginaw  
Midland, Michigan 48686-0995

RE: Treatability Study Report

Dear Mr. Mersereau-Kempf:

The U.S. Environmental Protection Agency (EPA) has reviewed the Treatability Study Report (TS Report), Bench-Scale Test Protocol: Effect of Roto-Tilling on VOC Volatilization from Howe Valley Soils dated August 25, 1992. EPA hereby approves the TS Report subject to revisions based on the comments that are attached to this letter. Some of these comments are procedural and may not be correctable by editing the Report; however, they are provided for your information for any future treatability studies. Since these comments do not affect the major conclusion of the TS Report ( i.e. that the treatment was effective) and a full scale testing of the treatment technique was performed, EPA determined that performing the study again was unnecessary. Please revise the Report and send four copies of the final version to EPA.

If you have any questions, please contact me at (404) 347-7791.

Sincerely,

*Felicia Barnett*

Felicia Barnett  
Remedial Project Manager  
KY/TN Section, NSRB

Attachment

cc: Jim Knauss, Hatcher-Sayre  
Rick Hogan, KY

**ATTACHMENT****HOWE VALLEY LANDFILL****REVIEW COMMENTS ON THE TREATABILITY STUDY REPORT  
BENCH-SCALE TEST PROTOCOL: EFFECT OF ROTO-TILLING ON  
VOC VOLATILIZATION FROM HOWE VALLEY SOILS*****Executive Summary***

1. Page 3, paragraph 3, sentence 2 - The units ( $\text{mg}/\text{m}^3 \text{ air}/\text{minute}$ ) do not seem to be appropriate rates for volatilization. The method for determining volatilization rate is not clearly stated.
2. Page 3, paragraph 3 - First thoughts about PCE volatilizing within the first few hours.  
"Was PCE lost so quickly because the spike never reached soil interstitial areas?"  
"Was soil analyzed immediately following spiking or was initial VOC value calculated based on spike weight/soil weight?"

***Introduction***

3. Page 3, paragraphs 5, 6, 7 - There is conflicting objectives and confusion between "site performance goals" and "site action levels." Was the objective to establish design and operating parameters for a full-scale process or to determine that "action levels" or "performance goals" could be met? Action levels and performance goals are not clearly stated.

***General Description***

4. Page 5, paragraph 2 - Why is moisture measured in percent by volume? Site data should be provided to show the actual range of soil moisture content found at the site.
5. Page 5 & 6, paragraph 3 - Why couldn't they control lower relative humidity (RH) in the low humidity chamber by purging chamber with dry air? In nature, unlimited supplies of low RH air would pass over tilled soil causing an extreme moisture gradient. If their intention was to simulate this, why didn't they? However, this case

-2-

would have only evaporated more moisture and PCE and would have resulted in greater PCE removal; therefore, the test "as conducted" is conservative.

#### *Assumptions*

6. Page 7, paragraph 1 - Roto-tilling consists of two removal processes (biodegradation & volatilization). Was there a desire to determine the predominant process or contribution of each to the removal of PCE? If so, they should have run a control using a closed system that allows biodegradation with a minimum volatilization.

#### *Procedures*

7. Site Soil Prep - Page 8, paragraph 4 - This section should describe how the soil was sieved and mixed.
8. Page 9, paragraph 2 - The chamber air control for low RH samples conflicts with the control method (and result) reported in General Description, pages 5 & 6, paragraph 3.

Does the statement "The chamber air was not circulated or vented" pertain to both the "low" and "high" RH chambers?

#### *Spiking Procedure*

9. Page 9, paragraphs 3, 4 & 5 - The spiking procedure should have included absorption period followed by initial analysis for PCE. PCE was not mixed in the soil. What basis is there for diluting PCE spike with methanol prior to addition to soil, especially if soil and solvent are not mixed. Could have simply spiked PCE directly at multiple points, allowed to diffuse, absorb, etc., and mix.

#### *VOC Measurements*

10. Page 10, paragraph 1 - Why weren't chamber VOC measurements conducted from 0-6 hours during time of greatest VOC volatilization?
11. Page 10, paragraph 3 - At this point, the VOC measurements in the chamber air/soil air space are considered coarse measurements; however, later in the report during PCE volatilization rate determination (page 11, paragraph 4), the VOC in air measurements are considered accurate and important data for determining

-3-

volatilization rates. What were the differences in monitoring or calibration techniques that made the VOC monitoring more accurate?

What was the calibration procedure? What was the response factor between isobutylene and PCE?

#### *Soil Sampling Procedures*

12. Page 11, paragraph 1 - Why wasn't a 0-hour sample collected? Were any duplicates collected and analyzed by sieve method?

#### *PCE Initial Volatilization Rate Procedures*

13. Page 11, paragraph 4 - What was the objective of performing this initial volatilization rate? The study is too data dependent on accurate measurement of VOC's in air using portable PID's. Methanol might still be detected on a 10.2 eV lamp even though methanol IP = 10.8.

#### *Results*

14. General - The results are not presented clearly. It is difficult to determine which test units are being discussed. Summary tables should follow the text.
15. Page 12, paragraph 6 - The VOC's in soil increased from 6 to 12 hours. There should be some explanation or comment.
16. Page 12, paragraphs 5 & 7 - No explanation as to why the lowest VOC's where detected in air chamber space during the period of greatest VOC removal 0-6 hrs? Why were chamber VOC's greater than soil surface VOC's?
17. Page 13, paragraphs 1 & 2 - Test results contain test procedures that are not outlined in the procedures section.
18. Page 13, paragraphs 3-5 - There is no mention of PCE increase over the 6-12 hour period. No analysis of 0-hour soil to show successful or lack of successful spike. No duplicates were analyzed. No data to determined variability and what a "significant difference is" i.e., was the volatilization rate for the low moisture soil significantly different than the high moisture soil?

-4-

19. Results General - Were the statistical analysis performed on duplicate test units? Where is a comparison of this data?
20. Page 13, paragraph 7, page 14, paragraphs 1-5 - Majority of test results are for the PCE volatilization rate study which is not mentioned in the original test plan nor in Figure 2 - Test program in this report.
21. Page 13, paragraph 5 - The initial volatilization rate is based on portable PID readings and a calculation that does not include a response factor of PCE to isobutylene. Also, there are questionable results due to humidity inference and no calibration dates. Also, result is in mg PCE/m<sup>3</sup>/minute - no measure of air flow to calculate mg<sup>PCE</sup>/minute or mg<sup>PCE</sup>/kg soil (area soil)/min.

#### *Discussions & Conclusions*

22. Page 15, paragraph 1 - The result of 38 mg PCE/minute per soil unit is not scalable. Does this soil unit refer to 3.4kg soil or for 4 soil units. Also, this rate is based on questionable (inaccurate or incomplete) monitoring techniques.
23. Page 15, paragraph 6 - How does static chamber air test results or test results during chamber air turnovers simulate the site environment? How could this be scalable?
24. Page 15, paragraph 7 - The difference in volatilization rates between low moisture and high moisture soil was not compared to differences in duplicate test units. How then could significance of differences be measured. The difference could also be a phenomenon of humidity interference with the portable PID. No calibration data is available to assess this possibility.
25. General - Although the data in general indicates that PCE volatilizes rapidly, the program did not assure that the initial state of the PCE in the soil was absorbed into soil micropores or at least at a state close to natural where most is in the pores, some as pure liquid, and some as vapor in pore spaces. Therefore, the rates measured could be much higher than actual.

#### *General*

The report format is confusing and does not follow CERCLA guidelines.

The test program objectives are not clearly stated.

-5-

Test procedures are not outlined in a complete test procedures section. Instead, some procedures are mentioned in the test results section (i.e., chamber air equilibrium tests).

The objectives of specific procedures and their relevance to the full-scale process are not clearly defined.

Volatilization rates should have also been estimated from soil VOC data and more soil VOC data and more soil VOC determinations should have been conducted during 0-6 hr period.

No real statistical data to determine how differences in test conditions effected volatilization rates.

**Spiking does not permit slow diffusion processes that can occur in the soil to take place. Micropores may not have reached equilibrium concentrations.**

Moisture content of the soil is determined by oven drying at 80 degrees Celsius overnight. According to ASTM D2216-80 (4), it should be oven dried at 110 plus or minus 5 degrees Celsius overnight.

**RESPONSE TO REVIEW COMMENTS ON THE  
TREATABILITY STUDY REPORT  
"BENCH-SCALE TEST PROTOCOL: EFFECT OF  
ROTO-TILLING ON VOC VOLATILIZATION FROM  
HOWE VALLEY SOILS"**

**SPECIFIC COMMENTS:**

1. The units chosen to express the rate of volatilization, mg/m<sup>3</sup> air/minute, report the change in PCE concentration in a known air space, relative to time. This presentation of the data allows for a logical comparison of the tetrachloroethene (PCE) concentration (in soil) to the PCE which has volatilized (into the closed chamber) on a weight basis. A brief description of the method for volatilization rate determination has been added to the Executive Summary.

2. PCE has a relatively high vapor pressure, and the bulk of PCE was rapidly lost from the soil units. However, as some of the compound was released slowly over the next four weeks (evidenced by the chamber VOC readings), and PCE was detected in the soil samples, we believe that some of the PCE added to the soil units did reach the interstitial soil areas.

Soil was not analyzed immediately after PCE spiking. The initial VOC concentration in the soils was based on the spike weight/soil weight.

3. The study objectives and site performance goals have been clarified on page 3 of the final report, paragraphs 2 and 3. The bench-scale testing which is discussed in this report was designed to test various procedures and site conditions, and to optimize the remedial design of the selected technology.

4. Soil moisture can be presented as either percent moisture by volume or by weight. As stated in the "Treatability Study Work Plan for the Howe Valley Site, Bench-Scale Test Protocol: Effect of Roto-Tilling on VOC Volatilization from Howe Valley Soils, Prepared by The Dragun Corporation, April 30, 1992" (Work Plan), these studies were conducted using soil moisture presented on a volume basis.

The objective of choosing the two soil moistures was to conduct the study using extreme moisture conditions which could exist at the site (i.e., dry conditions, and conditions following heavy rains). As the soil moisture conditions chosen are extreme scenarios, it was not deemed necessary to use actual site soil moisture data (Work Plan).

5. It is true that the relative humidity (RH) in the chambers could have been controlled by purging with dry air. However, our set-up studies did not indicate that maintaining the low RH (< 30%) in the chambers would require air-purging equipment. As stated by the reviewer, the high RH in all the chambers created a worst-case situation for the volatilization of the PCE, and the study is therefore conservative. Additional discussion has been added to the final report text, page 6, paragraph 4.
6. It is true that roto-tilling could enhance biodegradation of PCE as well as volatilization of PCE from the soil. However, the purpose of mentioning that microbiological activity exists in the soil units as in the field was to emphasize that laboratory conditions would simulate most field conditions. There was no attempt in this study to determine the contribution of microbiological activity in the reduction of PCE concentration in the soil. Clarification has been added to the final report, page 8, paragraph 1.
7. More information about soil collection has been added to the "Site Soil Preparation Procedures;" final report, page 8, paragraph 6.
8. Procedures in the General Description of the final report have been updated to correspond with the "Preliminary Procedures" section (page 9, paragraph 5). Results from these measurements are discussed later in the text.

The chamber air was not circulated or vented in any of the chambers during the study. This has been clarified in the final report, page 9, paragraph 5.

9. As stated in the Work Plan and the letter addendum to the work plan dated May 26, 1992, significant slow diffusion of PCE into select soil pores following the spike will not occur. However, we believe that this process accounts for only a small portion of the total sorption processes. The data from the chamber air VOC measurements over the four-week study suggest that some PCE was adsorbed by the soils, then slowly released.

The soil was not mixed immediately following PCE spiking because it is believed that significant volatilization of the compound would have occurred. Paragraph 2 of page 10 in the final report has been amended to add this information.

As stated in the protocol, only 1.1 g of PCE (density 1.6 g/ml) was added to each unit of soil. The total volume of PCE added without dilution would be less than 1 ml. Therefore, in order to have an even distribution of PCE in the soil unit, it was

necessary to dilute the chemical with methanol. As stated above, mixing the soil at the time of the PCE spike would have resulted in significant volatilization of the chemical; therefore, we did not mix the soil.

10. As stated in the Work Plan, the first scheduled data points were collected from the soil units and chambers at 6 hours. The high initial rate of PCE volatilization due to the high clay content of the soil (determined in subsequent experiments) was not anticipated when the study plan was devised.
11. The VOC measurements of chamber and soil air were used for daily monitoring of the study progress. The actual PCE concentrations in the soil were determined by gas chromatography and mass spectroscopy. Page 10, paragraph 6, in the final report has been amended to clarify this point.

The PID instrument was calibrated according to manufacturer's instructions. This included at least one calibration daily to isobutylene. The response factor between isobutylene and PCE is 1.04. To account for any interference of RH in the PID readings, a background measurement from an empty high RH chamber was taken during each calibration procedure. This amount was subtracted from the chamber air VOC measurement. The VOC Measurements Procedures section of the final report has been amended to include more detail about the PID calibration (page 10, paragraphs 4 and 5).

12. No soil sample was taken at the time of the PCE spike. The zero-hour time point was assumed to be approximately 200 ppm (spike concentration). Additional mixing of the soil at this time would a) decrease the potential migration of PCE into interstitial pores, and b) increase volatilization of the PCE and thus decrease the potential soil sorption. No sample duplicate was analyzed by the sieve method.
13. The small study discussed on page 12, paragraph 3, of the final report was conducted to determine whether the lack of PCE in the soil samples from the soil units could be attributed to rapid PCE volatilization. Prior to conducting the initial PCE volatilization rate studies, the effect of methanol on the PID readings was determined. Using a PID with a 10.2 eV lamp, negligible (< 1 ppm) methanol was detected using the study conditions. The text has been amended in the final report to clarify these points in paragraphs 4 and 5 of page 12. More detail has been added to the PCE Initial Volatilization Rate Procedures section.

14. More detail has been added throughout the text to clarify which soil units are being discussed. Because there are a large number of figures and tables in this report, the figures and tables have been placed in separate appendices rather than in the report text.
15. As reported in the Daily Data Sheets, soil VOCs did not increase between the 6 and 12 hour time periods of the study. VOCs in the soil air were near or at non-detect levels for all soil units at the 6 and 12 hour readings. Additionally, as stated in paragraph 3, page 14 of the final report, very low soil VOC measurements (< 1 ppm) were obtained for the first 5 days of the study. Further comments have been added to paragraph 3, page 14.
16. The lowest chamber air VOCs in the study were detected between 6 and 12 hours. Our studies also suggest that the majority of the PCE spike volatilized prior to soil unit placement into the chamber. In addition, at low soil concentrations, soil mixing is needed for a measurable amount of PCE to be released.

Although it is expected that the chamber air and soil air VOC concentrations would be similar at equilibrium, the soil air concentrations are generally lower. This is an artifact of the soil VOC measurement, as the soil unit is removed from the chamber and placed in the fume hood prior to the VOC measurement.

More explanation has been added to the result section "VOC Determination Procedures" which addresses the low chamber air VOC concentration at the early sampling times of the study.

17. The procedures for increasing chamber air turnovers has been added to the procedure section "VOC Measurements".
18. There is no significant increase in VOC measurement of PCE between the 6 and 12 hour time periods. A decrease in PCE soil concentration over time is the general trend observed in this study.

It is true that no soil sample was taken immediately following the PCE spike. The study was designed to prevent PCE volatilization and to allow any soil adsorption of the PCE to occur. Immediate mixing and subsequent sampling of the soil would have contributed to PCE volatilization and decreased the amount adsorbed by the soil particles.

It is true that no duplicate samples from the soil units were analyzed; however, the experimental design included duplicate soil units for each set of study parameters. For example, HV1 and HV5 are duplicate soil units. In addition, because we were unable to maintain low RH in four chambers, there are actually just two study conditions (high- and low-moisture soil), each with four replicates.

To determine if high- and low-moisture soil had an effect on PCE release, the following calculation was performed. For each soil unit, the day that PCE was last detected in the soil was determined. The mean and standard deviation of the "last day" for high- and low-moisture soils were then calculated. Student's T-test was applied, and the two means were determined to be significantly different at the 0.05 level of confidence. This information has been added to the text on page 15, paragraph 5 of the final report.

19. The statistical analysis performed on the high- and low-moisture soils is described in the response to question 18 above.
20. It is true that the initial volatilization rate of PCE studies were not outlined in the study work plan. However, it was necessary to account for the PCE which had been added to the soil units but which was not found following the soil analyses. Therefore, to complete the bench-scale study, the initial volatilization rate of PCE from the soil units was determined. More detail has been added to the section "Results of Volatilization Rate Studies."

The initial PCE volatilization rate studies are not included in Figure 2 because they are not a component of that section of the study.

21. The initial volatilization rate is determined from PID data. As stated earlier, the response factor between isobutylene and PCE is 1.04; including the response factor in the calculation will not appreciably alter the results. The PID was calibrated in RH conditions similar to those in the chamber for the initial rate studies. The RH was relatively constant throughout the short time period of these studies (60%). Also, the PID was calibrated according to manufacturers specifications at the beginning and end of the initial rate studies. No calibration drift occurred with the instrument.

The final result for the initial PCE volatilization rate is expressed in mg/m<sup>3</sup>air/minute. This is an expression of the change in PCE mass (in a fixed space) over time. No air flow occurred, therefore no air flow was measured.

22. An initial rate of PCE volatilization from the spiked soil was determined as 38 mg/m<sup>3</sup>/minute. As this is an initial rate, the volatilization of PCE is not yet limited by the chamber air volume. Therefore, the initial rate is scalable to the concept of unlimited air space. If the rate had been determined from measurements of VOCs in the chamber beyond the initial 25 minutes of the experiment (see Figures 6a and 6b of the final report), then the rate would have been affected by the limited chamber volume, and thus would not be scalable.

The soil units referred to are HV1 through HV8, HV10, and HV11. This has been clarified in the text.

The calibration of the monitoring instrument (PID) has been discussed in detail earlier in this response.

23. In the static air chamber study (HV10 and HV11) an initial rate of PCE volatilization was determined. The initial rate is not dependent on the air space of the chamber. This is similar to the conditions of the Howe Valley site, where air space is not a limiting factor for VOC volatilization. Similarly, chamber air turnovers simulate the site conditions where the air is constantly moving and exchanging at the soil/air interface.
24. Overall, as shown in the Results and Discussion section, PCE volatilized more rapidly in the low-moisture soil units than in the high-moisture soil units. The statistical difference determined between the two study groups is based on the analysis of soil PCE content.
25. The data from the Howe Valley feasibility study show that PCE volatilizes rapidly from site soils. The data also suggest that some PCE was adsorbed to the soil particles in a close to "natural" setting. Although PCE was detected in the soil at low concentrations, the soil concentration decreased (to non-detect levels) over several days of mixing. The data support the fifth conclusion which states that roto-tilling of the Howe Valley soils will cause the VOC concentration in the soil to decrease to soil action levels in a short time period.

GENERAL COMMENTS:

1. The report format has been altered to more closely follow CERCLA Treatability Guidelines.

2. The test program objectives have been clarified in the Introduction section.
3. All test procedures are now discussed in the Procedures section of the report.
4. The "Results and Discussion" and the "Conclusion" sections contain information which discusses the objectives of the individual studies and their relevance to the full-scale process.
5. It is true that under some circumstances the volatilization rate could be estimated from the soil VOC analysis data. Originally, this was one objective of the study. However, the data obtained from the soil analysis in this study does not allow this type of determination because of its distribution. If we had known before the study was conducted that the PCE would volatilize so rapidly, more data points would have been collected in the 0 to 6 hour time frame.
6. Statistical evaluation has been conducted to compare the different test conditions. (See response to question 18, above).
7. As stated in the work plan, spiking was not expected to simulate slow diffusion processes into the micropores to equilibrium concentrations. However, PCE was released from the soil over the length of the study (four weeks), indicating that soil sorptive processes and slow diffusion did occur.
8. This soil contains a relatively high clay content. Drying of high clay soils at 110°C can cause the formation of a surface soil crust that inhibits the internal drying of soil aggregates. Also, use of high temperatures (110 °C) for oven drying of soils can cause breakdown and volatilization of organic matter in some soils.